THE
COMMERCIAL ORGANISATION
OF
ENGINEERING FACTORIES

HENRY SPENCER

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THE
COMMERCIAL ORGANISATION
OF
ENGINEERING FACTORIES

THE

COMMERCIAL ORGANISATION OF ENGINEERING FACTORIES

A HANDBOOK

TO

COMMERCIAL ENGINEERING,

BEING AN

EXPOSITION OF MODERN PRACTICE WITH FORMS AND PRECEDENTS
FOR THE USE OF DIRECTORS, SECRETARIES, MANAGERS,
ACCOUNTANTS, CASHIERS, AND ALL STUDENTS
OF INDUSTRIAL ECONOMY,

By HENRY SPENCER

WITH 92 ILLUSTRATIONS

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PREFACE

THE object of this work is to place in the hands of those responsible for the administrative control of our engineering workshops, and of aspirants thereto, a record of those principles which make for sound business doctrine ; and to demonstrate the application of those principles by an enunciation of the procedure that experience has proved to be of fundamental importance for the ultimate achievement of the purpose in view. The tendency of late years has been more and more toward the equipment of specially-designed plant for rapid production and maximum output, with which consideration the question of fixed maximum remuneration of the workers has come to be regarded as irreconcilable and inconsistent.

In applying this proposition to our centres of industry, there has gradually developed a need and demand for exactness and accuracy that has reached at last the portals of those responsible for the distribution of that which is produced by the skill of the workers, in response to which there has arisen the office of commercial engineer, or, as it has been denominated in the United States, production engineer. The primary duty of this functionary is the scientific development and control of channels for the prompt collection of facts, regarding the fluctuating tendencies in factory production, for the guidance of the supreme head of the establishment.

The manner of arriving at these results, and the principles upon which the prescribed procedure is based, are points that have been carefully dealt with in the following pages.

It was intended to include in an Appendix, an application of these important principles to a smaller works, having a more moderate staff than would be found in an establishment such as is referred to, but this has been reserved for a future edition. Any suggestions with reference thereto, as also to the present work, will be gladly welcomed and acknowledged.

The Author desires to express his sincere thanks to the proprietors of "The Engineer" for the prominence that was accorded to the series of articles on this subject, published in the columns of that paper, and to JOHN ADAMS for his valuable assistance in the preparation of this work for the press.

HENRY SPENCER.

2 INVERCLYDE GARDENS,
PARTICK, GLASGOW
January, 1907.

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INTRODUCTION

THE immense importance of an efficient, comprehensive system of Commercial Organisation throughout the length and breadth of the factory, with its resultant vitality in the general tone of all departments, has been amply demonstrated by the testimony and experience of such eminent writers as the late J. Slater Lewis and H. L. Arnold.

Indeed, such is its value from the viewpoint of economy in the general administration of the factory, it may be stated without fear of contradiction, that the tardiness of its recognition has produced more obituary notices for the 'London Gazette' than financiers have ever suspected. Not that there has, necessarily, been any lack of system with the deep-rooted, time-endeared customs of an earlier day, but that there has not been that conformity with latter day engineering practice in both office and factory, nor the necessary cohesion between the departments of production and distribution, the consolidation of which alone will present that combative force so essentially a product of a well-adapted system of organisation.

In the following pages, in which is described the whole commercial routine of an engineering factory, special attention is directed to the principles of organisation which underlie the methods adopted by a present-day administration. It will immediately be observed that the routine is separately outlined for each department, as distinct units of a homogeneous whole, and that the duties involved are such as may be efficiently performed by the existing staff of any large undertaking under capable direction. Formidable though such a description of commercial routine may appear to the student of modern engineering methods, the system is not more overwhelming than an imperfect, if less elaborate, contemporary system would appear if described in similar detail.

The ultimate goal towards which this assembling of forces is directed, is of course the establishment of an all-alert, adjustable, though incisive system of inquiry, whereby a constant flow of intelligence is maintained between the field of operation and the source of its control. It is a system which has for its immediate objective the regulation of that creative energy derived from the combination of mechanical movements with human effort and skill.

The assembling of records and the comparison of facts which a perpetual system of inquiry brings to light, is therefore merely a bridge over which is ultimately to pass that regulating influence by which economies are to be effected, existing energies developed and directed into useful channels, and the sources of leakage and waste effectively closed. The necessity is one that is demanded by an age of highly specialised equipment, the coming of which has entirely changed and transformed the old order of things, and, by rendering possible a greater degree of accuracy with increased output in all departments, signalised the dawn of keener competition in trade. In so far then as it is a question of grouping and presenting statistics as a means of furthering the possibilities of more economic control and increased output, the situation is a problem that may only be met by a highly specialised system of accounting ; but for the effective application of these statistics to the principles of manufacture and factory control, there must be a combination of accounting experience with engineering administrative ability.

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CHAPTER I.

CORRESPONDENCE DEPARTMENT.

Incoming Mails.—The duties of the organising accountant may rightly be said to commence with the receipt and despatch of correspondence incidental to the conduct of the firm's business.

Dealing first with the inwards letters, or correspondence received from outside sources, the custom of arranging with the postal authorities for the delivery of all letters to a special messenger from the firm, instead of through the ordinary medium, is first worthy of comment. By this means, the risk of pilfering from letter boxes, and of delayed delivery, is avoided. The practice is to provide a leather bag, fitted with a lock having duplicate keys, one of which is retained by the postmaster.

The Card System.—Among the numerous methods adopted for the preservation of inwards correspondence, there is none that more deservedly commands the attention of its ever-widening field of advocates than that known as the "card system."

Wherever records are to be filed for further reference, whether in the industrial, commercial, or professional world, its ready adaptability, and the value of its immediate access for information, demonstrate its worth as an economist, in the highest sense.

Filing Arrangements.—But the success of its adoption is greatly dependent upon the suitability of the outfit obtained at its installation, and nothing compromises its successful working so much as does the substitution of cheaper cards and unsuitable storage provision, for the appliances that are specially manufactured, under expert management, by the firms whose speciality is the installation of the "card system." The cards should be strictly uniform in size, with a good writing surface, and true shear-cut edges that will not split with handling. These are contained in a drawer-cabinet, as described in a subsequent paragraph.

Registration. — Simultaneously with the preliminary perusal of the letters by the secretary or other official authorised to open the mail bag, the chief correspondence clerk writes up the postal register described by Fig. 1.

..................*Company, Ltd.* *London.*

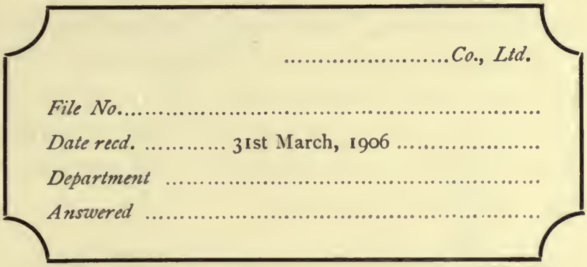
POSTAL REGISTER.

Date received.	File No.	Received from	Subject.	For dept.	Handed to	Date retd.	Filed by
A	B	C	D	E	F	G	H

FIG. 1.—POSTAL REGISTER. SIZE, FOOLSCAP.

Each letter should be indorsed immediately on opening with a self-dating rubber stamp similar to that described by

Fig. 2. It should then be handed to the correspondence clerk for entry in the postal register, when columns A, B, and C are completed by insertion of the required information, and each letter indorsed with the number of the file to which it is to be ultimately relegated.



......................*Co., Ltd.*

File No...

Date recd. .... 31st March, 1906 ....

Department ....

Answered ....

FIG. 2.—SELF-DATING STAMP.

Having registered the receipt of all letters, telegrams, and postal packages in this manner, the secretary then takes charge of the same, and after filling in columns D, E, F in the register, and the name of the department in the space provided by the stamped impress on the face of the letter, passes the correspondence forward to the departments concerned for attention.

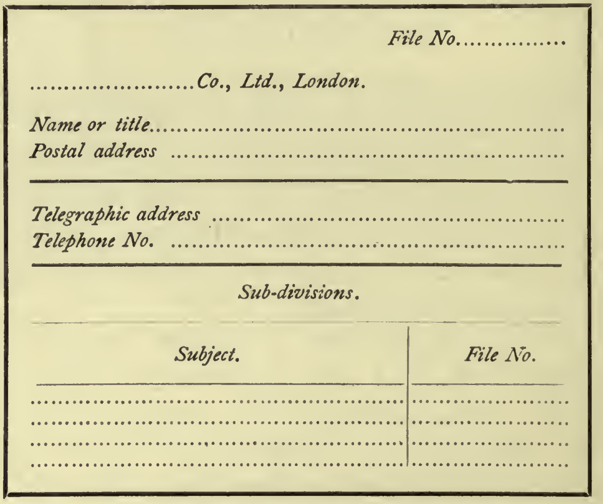
It will be observed that a complete record of each day's letters, etc., and their deposition, now appears in the postal register, and as it is essential that prompt attention shall be given to the various communications, any delay will be at once apparent by a vacant space in the column provided for date of return from the respective departments.

Correspondence Index.—Following the transfer of letters to the officials in charge of the various departments, a card index described by Fig. 3 is compiled by reference to the register.

These cards must be numbered in the right-hand corner, the number of the card being identical with that already given in the register to letters received from the various firms enumerated.

Care should be taken that one number only is given to each firm, no matter how extensive or frequent their communications may be.

The correspondence index cards are filed vertically in drawer cabinets, in alphabetical order according to name of firm, and form a most useful source of information, particularly as they may be employed to carry information relating to pay-day for settlement of accounts, financial standing, name of bankers, trade references, etc.



File No...............

......................*Co., Ltd., London.*

Name or title..
Postal address ....

Telegraphic address ....
Telephone No. ....

Sub-divisions.

Subject.	*File No.*
....	....
....	....
....	....
....	....

FIG. 3.—CORRESPONDENCE INDEX. SIZE, 5 IN. BY 3 IN.

Files for Letters.—When necessary to refer to any communication, the number of the index card will indicate the locality of the letter file in which the letters have been placed, and described in Fig. 4.

This simple form of file or binder is a plain sheet of stout manila paper, folded in such a manner as to allow the back, bearing the correspondence No., to project about half an inch for ready location. They are filed on end, similarly to the cards, in a cabinet of drawers with an inside capacity of about 30 inches deep.

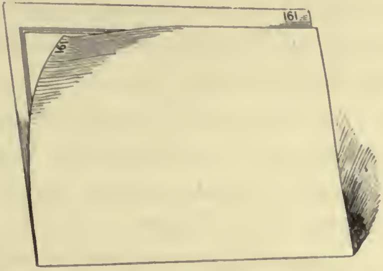


FIG. 4.—LETTER FILE.

Sub-divisions.—Should it be found desirable to dissect the correspondence with certain firms, so as to readily turn up communications regarding any special subject, e.g. accounts, quotations, orders, etc., the practice is to apply the decimal system to the letter-files in which such letters are contained. For example, by reference to the card index, it is ascertained that No. 1 is the file which contains the general correspondence of Jones, Brown and Smith, this card being located in the section comprised under letter J.

Turning to the letter filing cabinet, the drawer containing file No. 1 is withdrawn and the required correspondence is immediately accessible. Should letters from Jones, Brown and Smith bearing on matters relating to their account be kept separate from the general correspondence, the card index will refer to file No. 1·1, which will be found immediately behind the general correspondence file No. 1.

Replies.—It should be noted that, when the letter is returned from the department which has dealt with the matter, a carbon copy of the reply is attached to the letter received from Jones, Brown and Smith, and both are filed in datal order in the letter file.

By this rule, the whole of the correspondence is at once brought under notice.

The utility of this practice will be immediately apparent, and its superiority over the old system of press-copy letter books, with the much laboured reference from inwards file to letter book and *vice versâ* is too patent for words.

The next subject for consideration is the mailing of replies. The heads of the various departments having checked and signed their respective letters, will pass the same forward, together with the duplicate copies, addressed envelopes and enclosures, if any, to the correspondence office.

Enclosures.—In order to insure the proper despatch of documents intended for enclosures with letters, it is desirable to employ the "enclosure slip" described by Fig. 5. (This form should have a gummed edge.)

For enclosure to

M ....

FIG. 5.—ENCLOSURE SLIP.

Sorting.—On reaching the correspondence office, the work of sorting the letters into alphabetical order with the aid of one of the various stationers' devices available for the purpose, and the stamping of the letters, parcels, etc., for entry in the postage book, described by Fig. 6, is now proceeded with.

Mailing Desk.—This important duty is one that is all too frequently left to the care of an irresponsible junior clerk, often to a mere boy with the most vague ideas of the necessity for method and care. A very large percentage of the mistakes arising in the mailing department are certainly due to the lateness of the hour at which the work is often performed, and the consequent haste to get away to outside appointments. Too much stress cannot, therefore, be laid on the importance of dealing with the correspondence early in the day, so that only a small proportion will remain for mailing at closing time.

In large establishments, it is usual to distribute this work among all the clerks, two being told off by the chief clerk each day for the purpose, and a chart is hung in the office, setting out the postal arrangements in each week; and the system has much to commend it.

In this case, the folding and stamping are undertaken by the elder clerk in charge of the work, who checks the enclosures and calls out the necessary particulars for the other to write up the "postage book" described below.

POSTAGE BOOK.

Date.	Time and place of posting.	Description.	Addressee.	Amount of postage.			Clerk's initials.

Fig. 6.—Postage Book. Size, Foolscap.

Postage Account.—In order to check the value of stamps on hand with the total amount credited through the above register, a balance is struck at the close of each day and carried forward to the following day's account.

The importance of exercising a careful supervision over the postage stamp account is too self-evident to call for special comment, and access to the stamps should only be given to the person responsible for their custody.

Card Index compared with Books.—The next point for consideration is a ready location of the index card and the letter file respectively. It will be observed that not only is the necessity for re-writing and transcription, so often deplored in book records, obviated by the elasticity of the "card system," but the facility for ascertaining the required information is immensely greater than in the system of indexing by means of books.. And who does not recall the irksome task of frequent transcription of records carefully committed to bound indexes which have, eventually, been found of altogether insufficient capacity, in spite of the care taken that "B" should have twice the number of pages allotted to "Y" and so forth. But with the introduction of the "card system" this necessity is a thing of the past. For a system of "binding" in drawers knows no limit of capacity, and the arrangement of names in alphabetical or numerical order, by means of loose "pointers" calls for no transcription.

Guide Cards.—These "pointers," or "guides" as they are more frequently called, are tinted boards of the same dimensions as their respective index cards and letter files, with the exception that they are arranged with a projection of ¼ inch to ½ inch extending from one-fifth, one-third, or one-half of their whole length, so that five positions are obtained by the use of the first, three by the second, and two by the last named.

The "guides" are distributed over the index cards in the proportion of one of the former to ten of the latter, and in such a manner that no two guides of one position are permitted to follow each other.

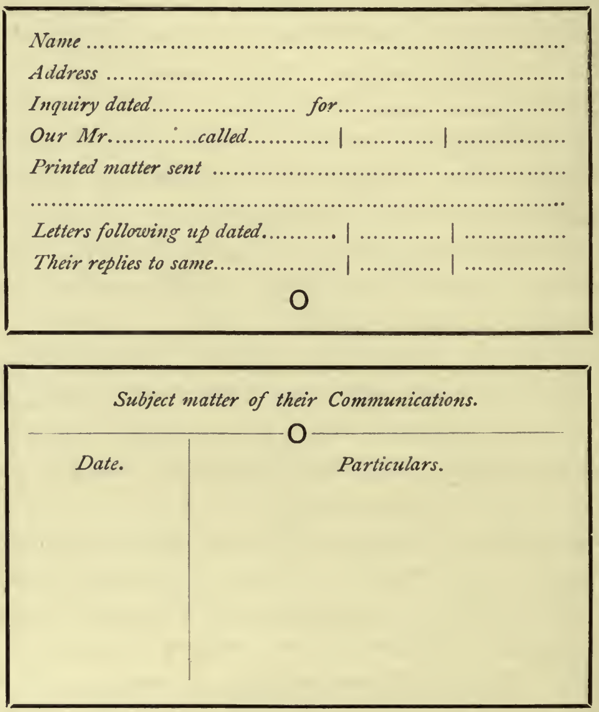
The "guide" carries the name of the firm, whose index card it precedes, typed or written on the point of projection, being inserted in order of sequence according to "position" of projecting tab.

Trade Classification of Guides.—In houses where it is desirable to periodically circularise clients in order to bring before their notice special lines of produce peculiar to their respective trades, the use of the coloured index cards for each business is found to be most valuable. By the employment of separate tints for each industry or profession, the utility of this distinction is particularly appreciable. An excellent substitute for the distinctive tint in this connection is obtained by the use of tab cards on the numerical system of "pointers," a separate number being given to each trade.

Letter File Guides.—The "guides" used in conjunction with the letter files differ from those in the card index in that they are indorsed with the number of the file, the position of which they locate, instead of with the name of firm.

Following up Inquiries.—For the purpose of following up inquiries received from prospective buyers, it can be said without fear of contradiction that the cards present a most valuable solution of the problem in the proverbial nutshell. The importance of keeping in touch with an inquiry and of pressing the same forward to successful finality is a question that admits of no controversy. Nor is it a less established fact that the amount and aggregate value of business effected by a methodical and carefully planned "follow-up" system, is far in excess of that accruing from the more expensive, though very necessary and desirable, system of reference to district agent and personal calls.

The adaptation of the card system in keeping touch with inquiries, is illustrated by Fig. 7. This card shows the various dates of calls, the name of representative of the firm having the matter in hand, with brief notes as to what transpires in subsequent correspondence. It is filed in front of the tab card bearing the date of month on which a call is intended to be made, and classifications of the cards under the names of the various travellers or agents may be made by the employment of different colours for the respective representatives. Reference is made daily to the inquiry index, to ascertain what has been put forward for attention ; and the guide card is taken forward to the rear of the drawer until again required.



Name ....

Address ....

Inquiry dated..................... *for*.................................

Our Mr............*called*............ | .... | ....

Printed matter sent ....

....

Letters following up dated.......... | .... | ....

Their replies to same.................. | .... | ....

O

Subject matter of their Communications.

O

Date.	*Particulars.*

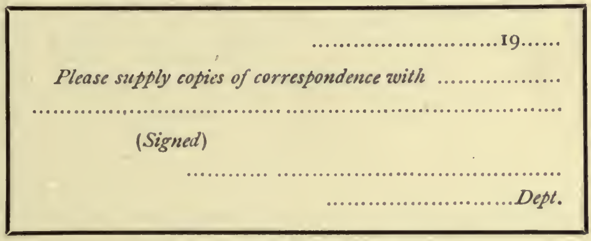
(*Reverse side.*)

FIG. 7.—INQUIRIES INDEX CARD. SIZE, 5 IN. BY 3 IN.

If desired, inquiries may be classified under their respective districts by the use of "guide cards," bearing the names of towns, behind which are filed the particulars of any inquiry, which is either in abeyance or waiting a personal call.

Filing.—The careful preservation of correspondence received and the replies thereto, is a duty that admits no laxity or delay if there is to be due accessibility for future reference.

Pending an opportunity for placing the matters in their respective files, which should be done within twenty-four hours at the latest, it is advisable to provide wicker-work trays for their temporary custody to prevent their being lost or mislaid. To facilitate the work of filing, it is customary to employ the number of the file, which is identical with that on the correspondence index card, as a reference to be typed at the head of the letter.



..........................19......

Please supply copies of correspondence with ....

....

(*Signed*)

....

..........................*Dept.*

FIG. 8.—REQUISITION FOR FILE.

Immunity from Loss.—An exceedingly economical method of filing letters, which is permanently accessible, is obtained by the use of manila paper folders on the "Stolzenberg" principle, which are supplied with a flexible metallic binder, at a very low cost, as a preventive against accidental loss of the contents. This type of file is particularly desirable in cases where there is a tendency (much to be deprecated) to remove letters for reference, a practice which frequently results in their being lost or mislaid.

Reference to Past Correspondence.—Whenever the necessity arises to refer to the files for information, the department requiring the correspondence should send a written request to the correspondence office on the form as Fig. 8. This will be retained as a receipt for the file withdrawn, so that it can be readily located if required by another department before its return, and will be exchanged for the file on its subsequent return.

......................*Co., Ltd.* *London.*

Telephone Message No............
Received at........*o'clock*...........*day* ....19......
....
....
....
....
....
To...............................
Please reply on the back of this form.
(*Signed*)...............................

FIG. 9.—TELEPHONE MESSAGES RECEIVED.

Telephone Messages.—The necessity for recording telephone conversations with outside firms is such as to demand recognition in a work on commercial organisation.

The urgent nature and importance of the duties that fall to the operator in the transmission of such messages, cannot be regarded too seriously ; and much that is deplorable in the misuse and abuse of this valuable means of inter-communication, would be entirely removed if the need for promptitude, intelligence, and method were more generally recognised.

As a means to this end, telephone messages should be committed to writing, and if the operator cannot himself reply to messages received, particularly those from distant exchange areas, the form described by Fig. 9 will be of considerable utility in dealing with inquiries.

A record of all messages received and transmitted should be kept in a similar form to that described by Fig. 10, and care should be taken that the same are duly confirmed by post, except in occasional instances where confirmation is uncalled for.

TELEPHONE MESSAGES.

.....................*day, March*, 31*st*, 1906.

No.	Time.	Messages, from or to.	Reply.	Confirmed by.

FIG. 10.—TELEPHONE MESSAGES. SIZE, FOOLSCAP.

Callers.—The question of visitors' calls is one that may not be passed unnoticed, inasmuch as an efficient administration demands that such calls, whether by appointment or promiscuous, shall receive just the measure of attention and consideration that their varying importance demands.

It is a generally accepted fact that much valuable time is wasted, and more important business neglected, by an injudicious extension of courtesy to casual callers ; and the situation is one that calls for careful discrimination and managerial surveillance.

As a means to this end, the use of the "caller's slip" described by Fig. 11 is customary and frequent. This is handed to the visitor desiring an interview with the firm's representative, and on being filled up is passed forward to the official interested.

To..........................

Mr..............................*of*..............................
desires an interview for the purpose of..........................
....
....
....
Date.................... 19...... *Called*.........*Left*...........
Remarks:...
....

FIG. 11.—CALLER'S SLIP.

The date and time are filled in by the person who first received the call, and the slip eventually finds its way to the general manager or his deputy.

CHAPTER II.

CONTRACTING DEPARTMENT.

Necessity for Discreet Contracting.—The duties of the purchasing agent represent a most important factor in the economical administration of the factory, and any indiscretion which marks the work of contracting for supplies leaves an indelible mark on the cost of finished product, and places a burden on the manufacturing department, of which it cannot afterwards be relieved. Much, of course, depends on the designer, but, granted that due regard has been given to the question of cost combined with the desire for efficiency, it may reasonably be said that economy of production commences with the purchase of material.

Registration of Catalogues, Circulars, etc.—In the organisation and equipment of the purchasing department, it is very essential that due regard be paid to the preservation and indexing of trade catalogues for ready reference. To this end, it is advisable to provide shelves for the reception of bound catalogues, each of which bears an adhesive numbered label on the back of the cover for the purpose of identification and registration in the "supplier's register," an A–Z index book described in Fig. 12. The catalogues are placed in numerical order on the shelves, numbered in order of receipt, and should bear the date of receipt.

Obsolete Catalogues.—Catalogues superseded by subsequent issues should be destroyed, being replaced by the new catalogue bearing the same number as the one which is cancelled. Circulars, booklets, and printed matter of a similar nature should be filed alphabetically in suitable stationery files, or in cabinets arranged on the "Shannon" system. In this case the entry in the "supplier's register" will be as described in Fig. 12. (Addison, Smith and Co., Ardwick and Gee.)

Shelf No.	Catalogue.	Name of Firm.	
I	A 26	Abbott and Sons, Ltd., London	A
I	A 43	Ackworth and Lloyd, Sheffield	B
—	Cabinet	Addison, Smith and Co., Bedford	C
2	A 72	Albert Motor Co., Ltd., Warwick	D
2	A 84	Alnwick Engine Works, Ltd., York	E
—	Cabinet	Ardwick and Gee, Manchester	F
			G

FIG. 12.—SUPPLIER'S REGISTER. SIZE, FOOLSCAP.

Card Index to Suppliers.—This method of preserving catalogues, pamphlets, etc., affords a ready reference to the productions of any given firm, and has its counterpart in the "buyer's register," described by Fig. 13. This form is

Where to buy..

Name of Firm.	Catalogue No.	Shelf No.
....	....	....
....	....	....
....	....	....
	O	

FIG. 13.—BUYER'S REGISTER. SIZE, 5 IN. BY 3 IN.
Printed on both sides.

an adaptation of the card-index system, which, on account of its illimitable scope and perfect accessibility, is eminently suited to this class of record to which additional references are constantly being made.

Storing and Issuing Catalogues.—In arranging for the storage of supplier's catalogues and their ready location when required for reference, it is well to bear in mind that one central library is far more desirable than the practice of allowing valuable data of this nature to lie about the drawers, shelves, and desks of various departments. "A place for everything and everything in its place" in this department is an object worthy of attainment, and its recognition will find justification in the consequent economy of

From Dept... 19......

Please supply catalogues as below :

....
....
....
....
....

○

(*Face.*)

○ *No.*...............

Catalogues received :

No. ....
,, ...
,, ...
,, ...
,, ...

Signed........................

(*Rear.*)

FIG. 14.—CATALOGUES REQUISITION. SIZE, 5 IN. BY 3 IN.

both time and labour. Having provided the library, it will be necessary to appoint a librarian, who should be held responsible for the custody, distribution, and safe return of the catalogues. The duty is one that usually devolves upon a junior clerk, but must not on that account be under-rated. For unless this work is carried out orderly and systematically, disorder and chaos must inevitably result. To avoid this, the requisition of catalogues for reference must be made in writing on the form described by Fig. 14.

The particulars of catalogues issued are entered on the reverse side of the form of requisition, and the signature of the person receiving same is obtained by the librarian. The form is then retained as a receipt to be returned when the catalogues are given up after perusal. By numbering and filing the requisition forms and substituting a correspondingly numbered card in each vacant space from which the catalogues or circulars have been taken, it is possible to refer without delay to the department from which the requisition emanated. This is desirable in view of any future requisition that may be received during the time such catalogues remain out of the hands of the librarian. Needless to say, a very necessary rule to be observed in this connection is that the catalogues withdrawn from the library are to be returned without undue delay, as any unnecessary detention of such often leads to loss. The librarian must therefore cause inquiry to be made after catalogues that are absent from the shelves during any prolonged period, and the receipt he holds will enable him to locate the department by which such have been withdrawn, as has already been pointed out.

Importance of a Knowledge of Contract Law.—Having compiled the records described by Figs. 12 and 13, we are in a position to ascertain quickly the various sources of supply, and to consider the important duty of purchasing supplies for the factory. Before dealing with the economic aspect of this important and responsible function, it is worth while considering the extent to which the firm is legally bound, and is entitled to hold contractors bound, by the acts of its purchasing agent. But the law of contracts is not a subject which may fittingly be considered in a work of this nature, all-important though the subject is to the commercial engineer. Reference should therefore be made to the existing books on the subject, of which the writer recommends Stevens' Mercantile Law. A knowledge of the principles of contract law is undoubtedly of such importance in the training for the commercial department, that too much emphasis cannot be laid upon the necessity for an intimate acquaintance with the fundamental principles which govern the responsibilities of vendor and purchaser. It is positively deplorable to note the ignorance of, and disregard paid to, the controlling principles of contracting, even to the point of litigation, with its resultant disorganisation.

Invitations for Tenders.—Turning to the routine necessary in the work of contracting for supplies, mention may be made of the commendable practice of inviting tenders from the various firms referred to in the buyers' register card index. Competitive prices are thereby obtained, together with samples when deemed necessary, of the class of stores required and to be quoted for, the comparison of which is of considerable utility, assistance, and value to the purchasing agent. In this connection it must be remembered that with the purchase of stores we are introduced to the vitally important question of manufacturing costs. Any want of vigilance, indiscriminate or hazardous contracting leaves an indelible mark in the subsequent records of costs of production, and imposes a burden upon the works in the initial stages of production, which no degree of efficiency during the progress of the work through the shops can liquidate or relieve. Hence it may be said that dividends are earned, and economies effected, even while yet the creation of the designer is in a state of transition from the atmosphere of its conception to the first stage of production.

Routine as to Ordering Stores.—The prevailing routine of ordering depleted stores for the factory commences with the passage of the "stores requisition" from the storekeeper to the purchasing department. This is described by Fig. 15, and as the duty of maintaining stocks within a fixed minimum and maximum range is one that devolves upon the storekeeper, the preliminary routine to be observed is relegated to the section in which the duties of the storekeeper are reviewed.

This is a foolscap book, the capacity of which will vary according to circumstances, and is quite self-explanatory. Each requisition should have the sanction of the works manager, as the head of the manufacturing department, who will O.K. and initial each item before the book goes forward to the purchasing department. Here the purchasing order number is entered opposite each item, to be

Date.	Description.	Quantity.	Weight.	Size.	For what purpose.	When required.	Sanctioned.	Ordered from.	Purchasing Order No.	When received Advise Dept.	Remarks.

← *Bound here.*

Fig. 15.—Stores Requisition Book.

quoted by any official inquiring subsequently for information as to delivery. The department for which the stores are requisitioned, in cases where the material is specially or urgently required, will be informed of delivery by the storekeeper.

Official Order Forms.—Passing from the receipt of requisitions and tenders, therefore, our next duty is the despatch of the official orders. It must be distinctly understood and observed under all circumstances, that the placing of contracts is to be ratified in writing on the recognised official order forms. This rule is a *sine qua non* in a well conducted business, and the non-observance of it results in obstruction and delay in meeting any inquiries that may afterwards be made in respect to overdue deliveries, repeat orders, etc. Local conditions and actual requirements must be consulted when designing the actual form of order to be employed. This may either be bound in book form with counterfoil or carbon duplicates, or may consist of loose sheets printed in copyable ink, when used in conjunction with the copying press, or in ordinary printer's ink when carbon copies are desired, and the orders required in type.

Numbered Orders for Subsequent Reference.—Fig. 16 suggests a form that may be adopted for the purpose of ordering supplies from outside sources after the receipt of tenders. It will greatly facilitate the subsequent work involved, in tracing and checking, if the purchasing agent will insist upon the official order number being mentioned on all advices of despatch and invoices. This number appears on the top right-hand corner, and is the mark of identification with the stores requisition. In the case of bound books the forms are numbered consecutively by the printer, but if loose sheets are employed with a view to obtaining either copies on the typewriter or in press copybooks, the number is usually filled in by the copyist. In

Telephone No............................
Telegraphic address ....
Cable codes used ....

Order No................
(To be quoted on Advice Note and Invoice.)

...................................*Co., Ltd.* *London.*
To ....
....

Please execute the undermentioned requisition, as per conditions on the back of this order, and acknowledge receipt without delay.

Quantity.	Description.	Price.

To be delivered to ....
.... Carriage........................
Within.....................days, per ....
Remarks : ....

For and on behalf of.....................Co., Ltd.
(Signed) ....

(*Face.*)

CONDITIONS OF ORDER.

QUANTITY.	Must not exceed that specified.
QUALITY.	No unsuitable stores will be accepted, but rejections will be notified within 14 days after receipt, when possible.
PRICE.	Must not exceed that specified.
ADVICE NOTES & INVOICES.	Must be sent in promptly, and must bear our Order No. Delayed payment may result through non-observance.
PAYMENT.	Against Monthly Statement of Account. Our pay day is third Wednesday in the month, and remittances are made for all accounts passed in respect to deliveries for the preceding month.

(*Reverse side.*)

FIG. 16.—PURCHASING ORDER FORM.

the latter case, the copybook folio is used, and great care should be exercised in order to prevent the order from being smeared and rendered illegible in the process. An appreciable advantage in the use of loose sheets in this connection lies in the fact that they can be passed on to any of the departments for the purpose of checking, countersigning, illustration by rough sketches, etc., without the dislocation of the work in the contract department that would result in such a necessity with the use of bound books. It will be noted that the conditions governing the contract are printed on the back of the order form. These conditions should be as concise as possible, and in strict conformity with the Act. This very necessary rule is one that is frequently transgressed by draftsmen of commercial forms, and the fault is one that tends to vitiate the value and utility of what is intended to be a safeguard against irregularities. An acknowledgment of receipt should be obtained from the addressee, and a more or less definite statement as to when delivery can be made. Non-observance of this rule sometimes results in vexatious and expensive delays, and nothing can be more unsatisfactory than a request for a copy of the order, in reply to pressure for delivery, with a statement that the original has *miscarried* or *been mislaid.*

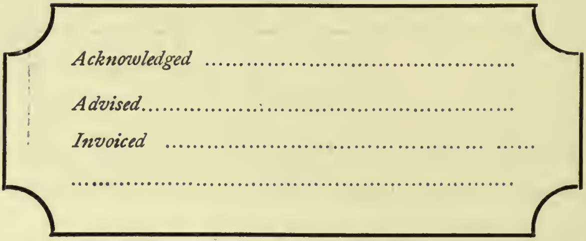
Name of Firm... ....

Date.	Our Order No.	Description.	For what purpose.	Date.	Despatched.	Price.

FIG. 17.—PURCHASING ORDERS REGISTER. SIZE, 17 IN. BY 12 IN.

Purchasing Orders Register.—This is in book form, ruled and printed as Fig. 17, and carries an A–Z index. Following the despatch of the purchasing orders just described, this record is written up bearing the name of the supplier at the head of the page. It is thus seen at a glance what orders have been placed with the firm under notice, and deliveries against the same are subsequently noted.

Following up Orders.—Having regard to the request for an acknowledgment of receipt of a purchasing order, defaulters are to be communicated with two days after the posting of an unacknowledged order. This may be done by post-card, and the work involved is reduced to a minimum by the use of cards printed in copyable ink, whereby the filling in of the order number is all that is necessary in addition to addressing. As an aid to the recording of acknowledgments of receipt and of advices of despatch, with invoice for the goods, it is usual to employ a rubber stamp as described by Fig. 18. This record is carried on the copy of order, and a rubber date stamp completes the equipment.



Acknowledged ....

Advised..

Invoiced ....

....

Fig. 18.—Rubber Stamp on Copy of Purchasing Order.

Delivery Time.—To secure due observance of the specified delivery time, postcards printed in copyable ink are employed in conjunction with the chart described by Fig. 19. This is prepared on a large sheet of paper mounted on pasteboard, the record being prepared on the day following the posting of the purchasing order. The order numbers are filled in under their respective due dates, three months being an ample capacity, and reference is made daily from the chart to the record of advices referred to above. The necessity for prompt delivery in this connection is sufficient justification for the work involved in keeping thus closely in touch with outstanding orders.

March, 1906.

1	2	3	5	6	7	8	9	10	12	13	14	15	16	17	19	20	21

April, 1906.

2	3	4	5	6	7	9	10	11	12	13	14	16	17	18	19	20	21	23	24	25

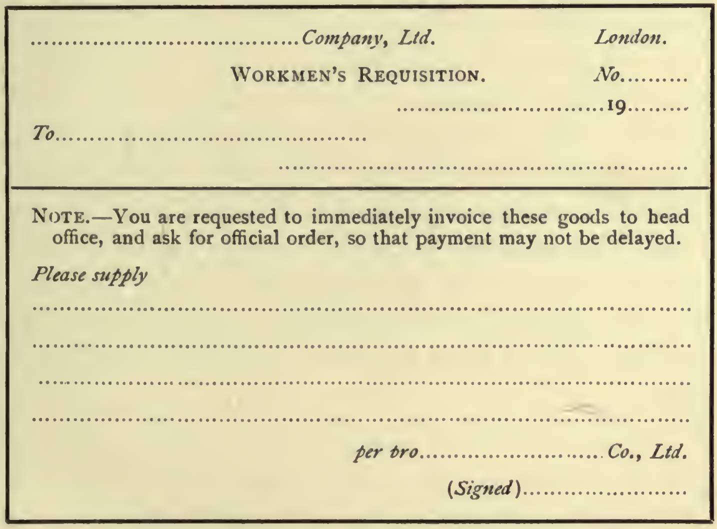
May, 1906.

1	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	19	21	22	23	24

FIG. 19.—OUTSTANDING ORDERS CHART.

Incoming Correspondence.—Among the matter received daily from the correspondence department may be enumerated tenders, acknowledgments of orders, inquiries and references to or arising from orders, and invitations for tenders, advices of despatch, invoices. It will probably be found desirable to pass back to that department for filing all tenders whether accepted or disapproved, together with correspondence of a general character, and arrangements would be made for the necessary sub-division of such matters for ready location in the files. But any correspondence relating to contracts outstanding may very advantageously be preserved in an outstanding contract file in contract department. These should be indorsed with the number of the purchasing order to which the letter has reference, and all such records should be filed in numerical order, so that the state of any order outstanding may readily be ascertained by reference to the number, which would of course be quoted by the storekeeper or other official in connection with the original requisition. Acknowledgments of orders would come under this classification, and as no useful purpose is served by preserving such communications for an indefinite period, these may be destroyed after an order has been filled and O.K'd. Advice notes, after noting date of despatch on the copy of the purchasing order, are to be passed on to the receiving clerk. Invoices are passed to contract department for the purpose of noting their receipt on copy of purchasing order as already referred to, and with the arrival of the advice note or invoice, the order is to be considered filled, and its number is immediately struck out of the order chart. It may be here noted that the invoice is indorsed with a self-dating rubber stamp, for particulars of which reference must be made to the section dealing with accounts department, described in a subsequent chapter. Before passing this forward to the receiving clerk, the purchasing agent will check the price chargeable by reference to the purchasing order and mark his initials in the space provided by the rubber stamp under the head of "prices checked." Should any inaccuracy be discovered in the process of checking, it is customary and desirable to call the vendor firm's attention to the irregularity, and ask for a credit note for the amount of any overcharge, on receipt of which the invoice and credit note are together passed forward to the official responsible for the receipt and checking of goods received.

Monogram Rubber Stamps for Checking.—It is an exceedingly convenient practice to use a small rubber stamp for the purpose of initialling, and thereby certifying the correctness of records in the nature of invoices, time-sheets, etc. At the cost of a few pence, a facsimile of two letters may be obtained, with metallic pencil case, such as is used by accountants for the purpose of an audit. This has a short spiral groove at one end for the purpose of exposing and receding the small rubber block carrying the



..................................*Company, Ltd.* *London.*

WORKMEN'S REQUISITION. *No*..........

............................19.........

To...

....

NOTE.—You are requested to immediately invoice these goods to head office, and ask for official order, so that payment may not be delayed.

Please supply

....

....

....

....

per pro..........................*Co., Ltd.*

(*Signed*)........................

FIG. 20.—OUTDOOR WORKMEN'S REQUISITION.
SIZE, 6½ IN. BY 3½ IN.

monogram, and is a very convenient size for the waistcoat pocket. A small inking pad is supplied in a metallic box measuring about 2 inches long and 1 inch wide, and the outfit is exceedingly useful to both shop foremen and the officials of the commercial department alike.

Outdoor Workmen's Requisition for Stores.—In the case of outside contracts, it is often necessary for the outside foreman to purchase stores at short notice from firms in the near vicinity of the job. In such circumstances it is not always convenient to wait for authority from headquarters to obtain credit on the firm's behalf on account of the delay that such procedure would occasion. Fig. 20 represents a form of order that may be used in such a contingency. This is a small manifold carbon copying book, having triplicate pages, two of which are perforated. One is handed to the firm on whom the order is drawn, and the other is posted to head office the same evening, while the third remains in the book for future reference. Its utility will be at once apparent to those who are acquainted with the confusion that is born of verbal unrecorded purchasing orders

CHAPTER III.

RECEIVING DEPARTMENT.

Record of Goods Received.—The duties of the receiving clerk are frequently allied to the work allotted to the storekeeper, who is the custodian of all stores received from outside sources, to be subsequently used in the manufacturing operations of the factory. It should be an irrevocable rule that, no matter what the nature of such supplies may be, they should be received and issued under the personal supervision and direction of the storekeeper. The receiving clerk will compare the quantities or weights of such stores with the consignor's form of advice note which is handed to him from contract department, and enter the correct particulars of the same in the "goods received" book described by Fig. 21.

This book is intended to furnish a record of all goods received, whether stores delivered on the authority of a purchasing order, goods sent for approval as in the case of samples, parts rejected or sent for repair by clients, etc., and, on account of its utility for many self-evident purposes, it is indispensable and universally adopted. By the use of separate books the consignments may be classified as circumstances demand. Herein is a description of the goods received with name of consignor, a description of packages in which they are contained, with weights, charges for carriage and freight as appearing on carrier's way-bill, etc. Mention may particularly be made of the provision for recording the date of supplier's invoices for stores, with a two-fold purpose in view. Not only are overdue invoices readily traced, but the probability of duplicate invoices being passed for payment is thereby considerably reduced. It has already been mentioned that each invoice is noted and checked by contract department, and such invoice duly finds its way to the receiving clerk for the purpose of checking quantities and weight. Should the former department fail to discover the fact that an invoice has already been passed, it is highly improbable that a careful receiving clerk would fall into the same error, seeing that the date of such invoice already appears in the "goods received" book. Following the record of receipt, and the work of checking, the receiving clerk will advise contract department of any shortages or breakages, and on reference to

Goods received ....day, 31 March, 1906.

Consignor.	Address.	Per	Weight.	Carriage.

(*Left-hand page.*)

Description.	Our Order.	Carrier's Invoice.	Supplier's Invoice.	Entd. Stores Ledg.

(*Right-hand page.*)

FIG. 21.—GOODS RECEIVED BOOK. SIZE, 9½ IN. BY 18 IN.

his advice notes, see to the prompt distribution of the goods to the department for which they are intended. The invoices are now passed on to accounts department to have the prices extensions checked as described in a subsequent chapter.

Suppliers' Packing Cases.—Due regard must be paid to the necessity for an early return of empty cases or other packages in which the stores have been conveyed, and the despatch clerk will receive considerable assistance from a methodical routine in this connection, particularly if, for the question of convenience, such packages cannot be emptied of their contents until some considerable time afterwards.

No. of Package.	From	Date Invoiced.	Date Returned.
1			
2			
3			
4			
5			

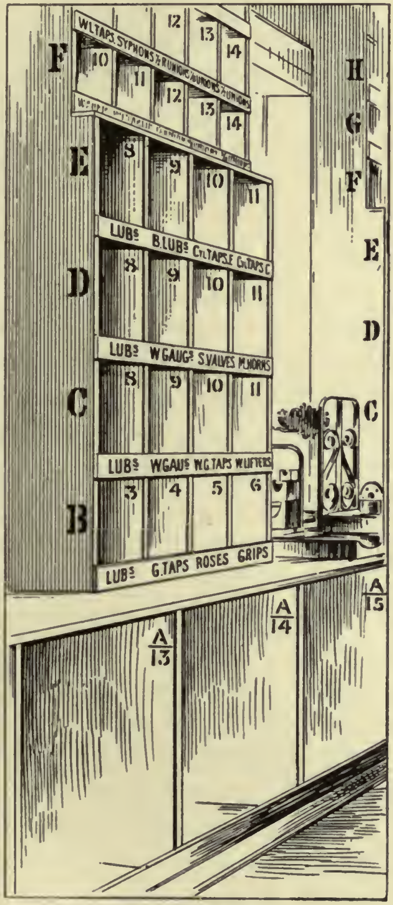
FIG. 22.—PACKAGES REGISTER. SIZE, OCTAVO.

With a view to the identification of packages, it is a very desirable practice to give each a separate number in strict rotation, and to keep a register of such numbers. For this purpose a system of coloured adhesive labels should be adopted, and each package should have one of the labels attached by the receiving clerk. Fig. 22 describes a form of register for recording the same numerically, and it may be mentioned that the number of identification is written on the face of the invoice, so that inquiries from accounts department respecting the whereabouts of any particular package may be readily cleared up by the citing of this number

CHAPTER IV.

THE STOREROOM.

The Need for Efficient Control.—Wherever serious consideration has been given to the important question of workshop organisation, there have been differences of opinion expressed in regard to specific routine and procedure. Varied experience begets divergent impressions and convictions, and differences of administration, local peculiarities more or less rooted and inevitable, with the accompanying dissimilarity of businesses exploited under the term of "Engineering," all have their effect on the variations of procedure, by which it is sought to apply fundamental and inviolable principles of organisation to existing methods of manufacture. But in connection with the issue of stores to the factory, whatever differences may be represented in the intrinsic value of such supplies, the desirability of an effective storeroom control is of such vital worth and importance, as to leave no lingering doubts in regard to need of correct records in this connection. The aggregate value of such stores as shown in the firm's record of purchases, is in itself sufficient justification for the existence of a department where such stores may be deposited for safe keeping, ready location, and judicious distribution. Herein is a demand for methodical classification so that any specific parts may be accessible with that readiness which is inseparable from a well-conducted successful manufacturing business. A system there must be, and if the output of the factory is to be maintained at its maximum capacity, the arrangements for the procuration of supplies must be the best that human thought and foresight can devise. But dexterity of handling and of transfer is not the only consideration that is taken into account by the



STOREROOM BINS.

provision of a separate department where supplies may be obtained. Else there would be justification for what is a very prevalent practice, even in these days of advanced commercial methods of factory organisation, in successful workshops producing a large turnover, where costly stores are permitted to be dumped in the various departments to be drawn upon as required, and without that close supervision which alone can prevent abuse and excess. Whatever reasons may be advanced in an attempt to justify such a practice in the deposition of stores, there are numerous instances on record of waste, leakages, and even dishonesty arising out of a disregard for a strict methodical control. Such instances as are brought to light are often discovered more by accident than by fixed intent, for the laxity which such a system betokens, gradually extends throughout the establishment and undermines all discipline. Economy in the cost of handling is undoubtedly obtained, but were it possible to make a comparison with the aggregate value of stores that are absolutely lost to the factory through the irregularities referred to above, the practice would receive scant consideration indeed. Doubtless, the existence of a well-founded storeroom is a pivot around which all the producing energies of the factory must operate. The question of its location is one that local circumstances alone can determine, and by the same test it must be decided whether to establish one central store or a number of departmental sections, with the two-fold purpose in view of close supervision combined with facility of access.

Structural Arrangements.— Assuming that the site chosen is one that is surrounded by the various departments whose duty it is to convert the rough or partly manufactured parts, in various stages of completion, into the saleable product of the factory, it may be mentioned that the storeroom is frequently a wooden structure, built up to line of view, and surmounted on all sides by a wooden framework covered with a woven wire mesh.

Internal Fittings.—The internal arrangements will consist of the necessary provision of an office for the clerical work involved in compiling the various records of stores received and issued, apertures for communication with employés requiring such stores for the factory, and on all sides bins, racks, drawers, shelves, glass wide-necked jars and other receptacles for the temporary custody of the stores, with which they will ultimately be filled. The bins are formed by rows of shelves having vertical divisions at intervals along their entire length, and are graduated in size from floor to roof according to the class of stores intended to be deposited therein. A wooden strip placed in front of the entire length of the shelves completes their box-like shape and leaves a small opening through which the material is drawn from its resting place, while insuring the impossibility of its falling out on to the room floor. This strip serves a further purpose for the numbering of the various bins and carries the name of the parts deposited there, together with a statement of the quantities in stock, which is sometimes preferred to the card register of stock hereinafter described. The names of parts and bin numbers are advisedly painted white on a black ground, and for ready location in a large store-room the letters of the alphabet are employed for further subdivision into sections. For the storage of bar iron, steel tubing, and other materials of a similar nature, it is customary to provide iron racks in which they can be carried horizontally; but should it be considered necessary as in the case of limited floor space, they may be stored vertically in racks, consisting of a light wooden frame within an exterior of woven wire network. Sheet metal is better stored on shelves of suitable width and length, the sheets being laid flat on account of their tendency to buckle under their own weight if placed upright in racks. Certain classes of stores are placed in drawers, and if of a costly nature it is a desirable safeguard to place them under lock and key. Tools such as stocks and dies, taps, drills, reamers, gauges, etc., are dealt with in this manner, and in a large factory it is customary to provide a separate storeroom for their custody, adjacent to the toolroom for the sake of convenience, and furnished with specially constructed drawers, divided into compartments and suitably marked with the description and sizes of the tools they contain. Heavy stores having an annular form, as in the case of large gear wheels, may be piled up in stacks around a central support so as to prevent their being accidentally overthrown. The best receptacles for small parts, bolts, nuts, pins, studs, rivets, etc., are strong glass jars with wide necks, which occupy little space, are open to view, and portable. Timber, of course, demands separate and special arrangements on account of the necessity for seasoning, and all bright machine parts should be carefully protected from damp by a judicious use of vaseline or similar preventive of rust. Whatever may be said in favour of permitting heavy stores to remain in the shops, in close proximity to the machine or fitting departments, rather than allowing them to be lodged temporarily in the storeroom, whether by reason of delay or cost in transporting from one department to another, it is bad policy to allow parts of insignificant size often in constant demand, to remain outside the storekeeper's custody indefinitely, as is the custom of some factories. Not only does the practice add to the difficulties of an accurate periodical stock valuation, but the waste through pilfering to make up shortages caused by spoiled work, or through unrecorded employment of such parts in the fitting and erecting departments, is of the gravest importance; while the folly of permitting such an irregularity in shops where a piecework, bonus or other differential payment system exists, is too self-evident to call for comment.

The Storekeeper.—Passing from the consideration of a well-founded storeroom, capacious, and methodically arranged with its rows of numbered bins, etc., we are led to consider the appointment of its controller, in whose custody is to be placed the valuable stock of visible assets represented by the vast collection of material. His is a stewardship of no mean order, for at his hands will be required a true and correct record as to the arrival and distribution of all the component details of stores employed directly and indirectly in the output of the factory ; and in the discharge of his responsibility he will require an intimate knowledge of the relation of his records to the work of both the manufacturing and commercial departments. In the issuing of material to the factory he will require an acquaintance with the details and function of the various classes of stores that are in his keeping, together with their location in the storeroom, and he will be expected to render a proper account to the costs department of the daily withdrawals. His duties will indeed be multifarious in their character, and will demand the exercise of considerable vigilance, firmness, method, and care.

Stores Ledger.—Fig. 23 is an adaptation of the "card system" to a form of stores account which is of immense service in recording a summary of stores received and issued, and in this connection it will be noticed that the first step is taken towards a periodical survey of stock on hand—a question to which further reference is made in a subsequent paragraph. This is a quarto sheet printed and ruled on both sides, a good ledger-quality being used owing to the frequent handling to which the record is subjected, and the sheets are arranged in alphabetical order according to the name of material which is written at the head of the page : and by the use of a "Premier" or similar file with loose index, an exceedingly useful "loose-leaf ledger" is obtained. The "Premier" patent file is a type that the author has long recommended and used on account of its suitability for accounts of this description, and is obtained at a very low cost from the dealer. The "loose leaf" system of accounting is recommended for the stores ledger as superior to the orthodox bound book, for a threefold reason, namely the greater utility of an alphabetical classification, whereby the work of posting up is facilitated and a readier means of reference obtained ; the impossibility of such a classification unless sheets can be inserted for each separate class of stores obtained from time to time ; and the possibility of removing any of the sheets without disturbing the remainder. The last named advantage is particularly obvious if one considers what frequent delays occur through the use of a bound book at such a time as stock-taking. The record cannot be permitted to fall into arrears, so that there is the work of writing up, balancing, comparing the account with the actual contents of the stores bins, and pricing up the quantities all awaiting attention. These are duties that

Ref. No............... *Description*..
Bin. No............... ....
Remarks ....*Max. Stock* ....*Min. Stock*.........

Received.		Issued.			Balance.		Supply ordered.		
Date.	Quantity.	Date.	What purpose.	Quantity.	Date.	Quantity.	Date.	Quantity.	Purchasing Order No.

FIG. 23.—STORES LEDGER. SIZE, 7 IN. BY 8½ IN.

may be distributed among various clerks, as is most desirable if the work of stock valuation is to be completed rapidly; but how impossible is the dissection of a book ledger to achieve that result. Nor may it be reasonably contended that loose leaves become lost or mislaid, for with ordinary care and vigilance this is a contingency that does not arise in actual practice.

An A–Z index is scarcely suitable for this type of ledger, as a minute subdivision for quick location of and reference to any required page can only be obtained by a special form of index. In this connection is recommended the use of a file of foolscap size, so as to accommodate index sheets sufficiently larger than the pages of the ledger, both in length and width, to allow projections on three sides. The index sheets may be of plain manila paper, cut as illustrated by Fig. 24, and are distributed through the ledger at proportionate distances so as to locate the position of the page whose title heading is identical with the name on the projecting sheet. Reverting to Fig. 23 ("stores ledger"), it will be noted that every item of stores, other than those of a special nature, has a reference number, in addition to its descriptive name, both of which are to be quoted in all references thereto, as far as is practicable, in order to insure a perfect understanding. The necessity for this is apparent when it is remembered that in so large a collection of stores there are many items which are certain to be described by other names than their official nomenclature, in spite of any attempts to make the same universal or common to all employés; and further, there are often parts of similar design whose only distinction lies in a slight difference of size necessary for different types of machines; or again, when a clear and definite distinction is impossible on account of the close relation of various details of a section of the machine the function of which is suggested in the naming of the component parts. These reference numbers to such stores as are in usual demand are duly registered in a "stores numerical classification" book, a copy of which is kept on hand in both contract and costs departments, and whenever an addition is made in the "stores ledger" the next vacant reference number is allocated thereto.

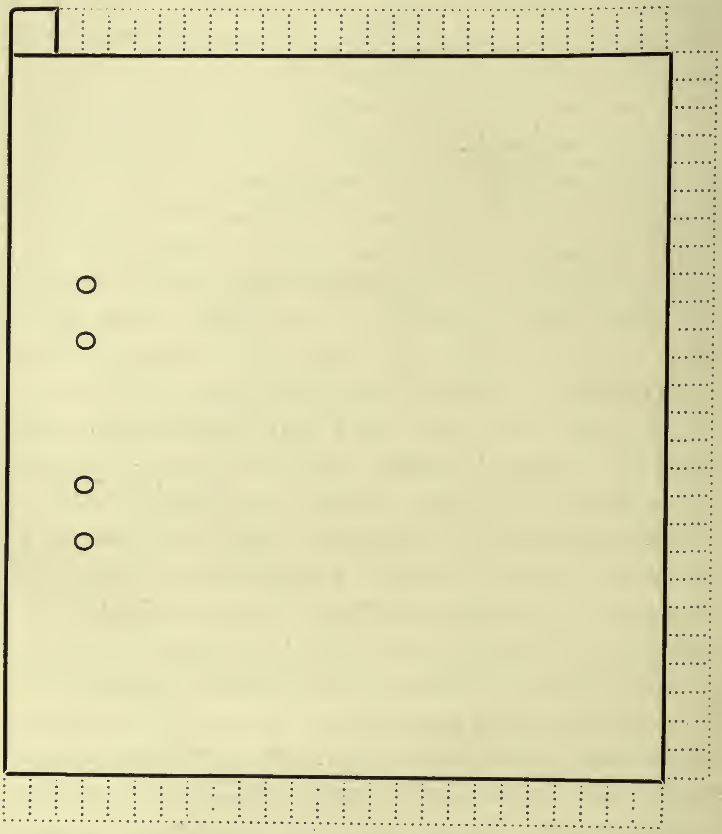


FIG. 24.—INDEX SHEETS.

Special Stores and Repairs.—Whenever stores of an unusual character are received, such as those specially required by customer in preference to standard parts, or in case of parts received for repairs, it is desirable to give them some distinctive mark either by an attached label or otherwise, for the purpose of identification during such time as they remain in the storeroom ; and to place them in some position where they are not liable to be overlooked or forgotten ; and it is the storekeeper's duty to ascertain and advise the department interested as to the arrival of such.

The System, not the Servant, Indispensable.—The utility of entering on each page of the "stores ledger" the number of the bin or other receptacle in which such stores are to be found, will appeal to all who have experienced the difficulties that arise in the event of temporary absence of the storekeepers, or through changes of staff, resulting in a total dislocation of routine consequent on the inability of anyone unacquainted with the storeroom arrangements, to determine the whereabouts of the required material. This is only one of the many experiences that are served up from time to time in factories where the system is such as to render the servant indispensable, whose memory and experience are preferred to the writing of records, and upon whose movements the accessibility of information depends. Herein is sufficient demonstration of the necessity for intelligent and complete records, such as can be grasped by anyone whose business it is to seek their aid, and on the existence of which a good standard of efficiency is alone to be guaranteed and maintained.

The Regulating of Stocks.—In order to keep the stock of respective parts at a desirable level, so as to prevent either surplus buying or unexpected depletion, it is very necessary to establish, and insist on conformity with, a predetermined rule by which the requisition and purchase of stores is to be governed. This rule may best be established by a joint consultation between the works manager and the heads of the contract and stores departments respectively, having regard to the state of the market and the requirements of the factory, and the quantity to be carried in stock at any period may be fixed between minimum and maximum limits. The two spaces at the top right-hand corner of the "stores ledger" are intended to exhibit this information, and serve as a guide to the storekeeper, who compares the state of the "received" and "issued" columns with the authorised quantity, and on the result of which makes his periodical "requisitions" on contract department in the book already referred to. A very desirable aid in this connection, as a guard against an untimely impoverished stock, is obtained by the use of a coloured disk, which is suspended from any bin the contents of which will shortly have to be replenished so as to bring them up to the authorised maximum quantity; and by a differently coloured disk to indicate that the stock has fallen below the desired minimum. Confirmation of these warnings or "remembrancers" is obtained by reference to the "balance" column in the "stores ledger," and simultaneously it will be seen whether a further supply has been ordered, as at the time of the despatch of such an order the purchasing order number and date of same are written in the column provided for the purpose, the information being obtained by reference to the "stores requisition book," Fig. 15. Provision has been made for the avoidance of undue delay in the execution of an order, responsibility for which rests upon contract department; but should the stock of any parts fall below the prescribed minimum limit, it is the duty of the storekeeper to advise the purchasing agent without delay.

Stock Audits.—One other point in favour of this "stores ledger" yet remaining for consideration is its availability for a periodical stock valuation for the accountant's quarterly balance and trading account, by means of which the accounts are brought under review and the position of the company ascertained. By this arrangement any excessive fluctuations of stocks may be effectively checked or controlled, departmental expenses reviewed and maintained within reasonable bounds, and the output of the factory compared with corresponding periods in previous accounts,

STOCK AUDIT ....*day of*...............................1906.

Bin No.	Quantity on hand.	Checked by	Audited by
A 1			
,, 2			
,, 3			
,, 4			
,, 5			
,, 6			
,, 7			
,, 8			
,, 9			
,, 10			
,, 11			
,, 12			
,, 13			
,, 14			
,, 15			
,, 16			
,, 17			
,, 18			
,, 19			
,, 20			

FIG. 25.—STOCK SHEET.

an effectual means of which is obtained by the use of diagrammatic curves which show upward and downward fluctuations at a glance.

For this perpetual system of stores audit, the use of prepared stock sheets is usual, these being printed and ruled in copyable ink for permanent record in a press copy book under the custody of the stock audit clerk. The sheets are ruled off into four columns as seen in Fig. 25, with the date of audit at the head of the sheet and bin numbers printed in. The work is performed by two persons, who will fill in the quantities, sign as checked, and pass the sheets forward each day to the audit clerk in the accountant's department for comparison with the "stores ledger," in which the balance is recorded, any differences being adjusted therein and an account kept of such adjustments, which are charged against the storeroom as an establishment expense.

Such a system of stock audit supersedes the old-time annual stocktaking with its prolonged stagnation of routine and all attendant evils, and prepares the way for a more prompt declaration of the value of stock on hand rendered possible by the distribution of the "loose leaf" ledger among a number of clerks, as referred to in an earlier paragraph, whose duties are to prepare the official "stock record" on foolscap sheets, ruled and lithographed with the bin numbers and description of contents, so that all that is required to complete the sheets is a statement of quantities in stock and their value, the sheets then being attached together, numbered, and the aggregate value ascertained.

Stores Rejected.—The necessity for an early examination of all stores received into the factory, in order that their suitability may be established and delivery formally accepted, is a question that only calls for reference in passing. Similarly, it may be said that the rejection of unsuitable, faulty, or damaged parts should be reported to contract department with as little delay as possible in order that the question may be promptly taken up with consignors. Delays in this connection may not, however, be always avoided. For example, a consignment of steel castings may include a number of faulty parts, that have either become warped and twisted in the process of annealing or contain objectionable blow-holes at some very important point, which lie just underneath the outside surface and cannot be detected by a superficial examination. Indeed, detection may not take place until such parts have been set up for machining, a considerable period from the date of delivery. Such a circumstance may not, unfortunately, be always foreseen, and any consequent complaint would not occasion any serious difficulty of adjustment. Should rejection be followed by a decision to return the faulty parts to senders, a "stores returns note" should be prepared on a similar form to that described by Fig. 26 and be passed on to correspondence department for posting simultaneously with the packing and forwarding of the goods. This form of "returns note" is intended to be used for packing cases and all classes of returns, and the space for "remarks" will permit reference to any correspondence that may have arisen in connection with such

RETURNS NOTE.

..........................*Co., Ltd.* *London*,
......................19......

To..

....

....

We have returned to you this day per..........................

.... *Carriage* ....

....

....

Remarks..

....

Kindly hand us your Credit Note for the above forthwith.

Yours faithfully,

For.......................... ......*Co., Ltd.*,

(*Signed*)..

FIG. 26.—STORES RETURNS NOTE. SIZE, OCTAVO.

rejections, and, for the guidance of book-keeping department, the date of supplier's invoice for the packing cases or other goods returned. Needless to say, this note should not be confused with the "delivery note" referred to subsequently, the one being a request for a credit note from supplier, and the other an advice note of despatch for goods sold, conditionally or otherwise.

The "stores returns" note, Fig. 26, is an octavo carbon-copying duplicate book, preferably lithographed in red ink for the purpose of distinction from the delivery note, and the pages are numbered in duplicate at the top right-hand corner. The question of accountancy which arises out of the return of goods is referred to fully in a subsequent chapter, which has special reference to the accounts department.

Stores Issued.—All withdrawals of material from the storeroom must be effected by a written order from the departmental foremen, as in this way alone can the "bona fides" of requisitions be relied upon and their identity guaranteed. This rule is one that may not be over-ridden with impunity, and the storekeeper should have instructions to exercise a discretionary supervision over such withdrawals and refer any apparent irregularities to the foreman from whom the requisition emanates. Various forms of requisition are described in a subsequent chapter dealing with the costs department, and the utility and purpose of each is carefully considered.

Stores Returned by Departments.—Arising out of the withdrawal and issue of material from the storeroom to the factory there is the question of surplus material obtained either inadvertently or intentionally, remaining over after the required quantity has been used. As an instance of this may be mentioned the issue of sheet metal or bar steel, obtained in stock sizes from the outside source of supply and withdrawn on the authority of the foreman in convenient quantities, for the purpose of cutting off the required amount in the shearing machine, lathe or sawing machine. Needless to say the entire quantity would be charged against the job in the storeroom record of material issued, and unless the unrequired surplus material be returned from the factory to be credited to the job, the overcharge would pass into the costs account uncorrected, resulting in the appearance of fictitious figures in both stock and cost accounts. Such an occurrence might be multiplied by frequent repetition into an irregularity of serious magnitude which would not be mitigated by any plea of oversight. Provision should, therefore, be made to insure the early return to the storeroom of all overdrawn material, and a form of written advice from the departmental foreman to storekeeper is described in the chapter devoted to the work of costing.

Wasters and Spoiled Work.—Notwithstanding the most careful supervision and close inspection that may be extended to the receipt of supplies and subsequent work of manufacture, there is an ever-present liability of imperfect material and careless workmanship resulting in irretrievable loss, through the compulsory "scrapping" of parts in various stages of completion. Whether the fault be one of design, supervision, artisanship, or, as occasionally happens, due to some temporary defect in the plant, the loss to the factory of more or less valuable material and labour, and what is perhaps still more important, the inconvenience and expense caused in the necessary replacement of such rejected parts often at an increased cost, are such as to demand the utmost prominence. Efforts may be made to hide the effects of carelessness in this connection, and in the organisation of a system this must be taken into account and as far as possible frustrated. How far success is attainable in this direction will be seen by reference to the use of the "waster-slip," the record of issues to the factory as appear both on the "schedule of parts" for fitting department, and on the cost card, together with the particulars of "finished stores received" which appear at the foot of the cost card, the respective functions of which are all described in the subsequent remarks on costing. The "waster-slip" accompanies the parts referred to in their passage from the foreman to storekeeper, and it is the duty of the latter to record the same in the "wasters register" hereinafter to be described, for the information of the works manager. In this way, by recording the parts issued from storeroom and comparing therewith the subsequent deliveries of finished goods on completion, an effective method of detecting leakages is obtained ; and the prominence that is given to spoiled work (from whatever cause arising) insures the interest of the works manager and an inquiry into the circumstances.

The Tools Store.—Tool-room supplies are, perhaps, less exempt from a reasonable suspicion as to their ultimate destiny than any other class of stores required for purposes of manufacture, particularly as regards such details as files and file-handles, hammer-heads and shafts, and such tools as are likely to be a source of temptation to the home-mechanician whose demand for tools is met unquestioned and unsupervised, in a badly controlled tools store. Many of the supplies from the tools store are, moreover, of an important and costly nature, and the liability of abusive use, at the hands of the careless and incompetent, of drills, taps, gauges, chasers, etc., is of such moment as to necessitate a careful administration for the detection of wanton misuse, breakage, and loss. It frequently happens that a workman will attempt to shield himself from the responsibility of such offences by pilfering the tools of his fellow, and it is necessary for discovery to have a proper record of tools issued from the tools store, which should be of such a nature as to render such acts easy of detection. As a means to this end each man should be supplied with a locker for the preservation of such tools as he is held responsible for the custody of, such locker having his shop number painted on. Many engineering firms supply a set of numbered metallic checks to each workman, one of which is to be given up to the tools storekeeper for each tool obtained, to be re-exchanged when the tool is subsequently returned ; and the system is one that works out successfully. But, apart from the cost of the provision of such checks and of a numbered board upon which they are hung in the tool store, there is the ever-present trouble arising from loss of the checks by the workmen, which is an objectionable feature. Perhaps the system of written records without the use of such checks, described below, has preferential features, and certainly meets all the needs of the case. In passing, it is worth while urging the great importance of stamping each tool, as far as is possible, with the name of the firm and an identification number, before issuing the same to the factory. A book is kept with the identification numbers of the several tools arranged down one column, other columns being given up to the date when issued new, description of the tool, and remarks such as date of ultimate loss, breakage, etc. Such a record enables the storekeeper to settle any dispute that may arise in consequence of one employé substituting his tools for those of another employé, as each man's tool card refers to the number of each tool in his possession.

Workman's Tool Card.—This is a folding card of stout texture, lithographed and ruled as Fig. 27, containing data as to the several tools issued to the workman whose name appears on the face of the card, and who is required to initial each entry made therein by the storekeeper, the card being kept in the man's locker. An official record is kept in the storekeeper's office as described by Fig. 28, and he will require each workman to produce such tools from time to time, so as to satisfy himself that they are intact and complete, taking care that such tools as are issued only for temporary use are returned to the store without undue delay. At the termination of a workman's employ all tools must be given up, and the "pay up" form (see wages department) duly initialled by the tools storekeeper as an assurance that the tool card is clear.

Folded along this line.
↓

Date.	Tools issued.	No.	Recd. by	Date.	Tools issued.	No.	Recd. by

FIG. 27.—TOOL CARD (*open*). SIZE, 10 IN. BY 8 IN.

Folded along this line.
↓

..................Co., Ltd., London.	NOTICE.
WORKMAN'S TOOL CARD.	Any unreasonable damage to, or loss of, any tool will have to be made good. No damaged tools will be accepted by Storekeeper unless accompanied by a note from the Foreman.
Name....................................	
No............	

FIG. 27.—TOOL CARD (*face*).

Workman's Tools Register.—The storekeeper's copy of the tool card is described by Fig. 28; a foolscap ledger with the usual A–Z index to workmen's names and tool account folio. From this record a list of all the tools held by the workman, whose name appears at the head of the page, is seen at a glance; and should any man's tool card be reported as lost, it is possible to supply a copy without any laborious references to the "tools store book."

Man's Name............................... *Shop No*............*Dept*............

Date.	Tools issued and Nos.	Tools book folio.	Date returned and remarks.

FIG. 28.—WORKMAN'S TOOLS REGISTER.

Tools Store Book.—Fig. 29 is a foolscap day-book, which is employed for the purpose of making a daily record of tools issued in their order of withdrawal, the requisition for same being given in written form in precisely similar manner to the requisition for general stores; and it is the storekeeper's duty to summarise such issues at the end of each month for the purpose of charging up, in the costs department, to their respective accounts.

Date.	Tools issued and Nos.	Man's name and shop No.	Tools Regis. folio.	Remarks.

FIG. 29.—TOOLS STORE BOOK.

The Timber Store.—The arrangements for storage of timber for the purpose of drying, and the periodical withdrawals from the timber stores of the various classes of timber as are required from time to time, present special and complex considerations which place the control of the same outside the scope of the general storekeeper ; and consequently the matter is one that is advisably directed and controlled by the foreman of the woodworking department whose duty it is to notify the storekeeper as to all timber used, for the purpose of charging the same to the cost of the particular job in the ordinary way. An accurate record of timber in stock should, of course, be kept by the foreman, in the work of which he will have any necessary assistance from the storekeeper, and the written record of such stock should be carefully checked at intervals in order that the quarterly balance and computation of stock values may be accurately carried out. The "stores ledger" record of timber received and withdrawn is of the special form described by Fig. 30, a separate page being reserved for each distinctive class of flitches or boards of varying sizes, and marks of identification are placed upon the same at the time of storage. The quantity of stock will of course be controlled by the state of the markets.

Description of Timber.............................. ....

Pile No.	No. of Boards.	Date received.	Bought from	Contents or Quantity.	Price bought at.	Remarks.

FIG. 30.—STORES LEDGER TIMBER RECORD.

CHAPTER V.

ESTIMATING DEPARTMENT.

Its Relation to Costs Department.—The duties of the estimating engineer are contained within certain fixed principles which remain constant throughout varying considerations that enter into the question of the preparation of estimates; considerations that vary with differences in the design, in the methods of manufacture, and in the elements of cost. These considerations present so wide a scope by reason of the immense field that is occupied by the engineering profession, that it is obviously impossible in a work of this nature to attempt an exhaustive exposition of procedure; and especially is this obvious when it is remembered that the rules and practice followed in the estimating department of one firm with essential success, would be altogether inapplicable to another firm in the same line of business by reason of the difference between the respective equipments of plant, the variance in cost and methods of administration, etc. But whatever may be the nature of the work to be performed, the component factors which it is the function of the estimating engineer to determine are, respectively, the value of the material that will be used, the cost of the labour involved, and the proportion of establishment expenses that will be incurred in the employment and remuneration of the producers. Hence it will be seen how largely the question of manufacturing costs enters into that of estimates, and not only is it desirable to establish an efficient costing system as a basis for the preparation of estimates, but for the limitation and elimination of errors either by under-estimating or over-estimating the probable cost, recourse should be had to data compiled from actual costs already ascertained.

Drawings for Estimating Purposes.—In order to avoid the possibility of any misunderstanding regarding the work to be quoted for, it is customary for inquiries handed in to estimating department to be accompanied by drawings fully descriptive of the required parts, giving dimensions and nature of the material to be used, and from such drawings and specifications, the estimating engineer will determine how and to what extent such parts are capable of production from the firm's existing plant, or recourse had to outside sources of supply, as reference to the library of catalogues may direct him.

The Estimating Engineer.—The foregoing remarks naturally lead one to the consideration of the necessary qualifications that are to be looked for in the official appointed to the control and direction of this eminently important department. First and foremost it is absolutely essential that he should be intimately acquainted with the capacity and nature of the plant at his disposal, the feeds and speeds of each machine tool under varying conditions, and, in the case of repetition work, be prepared to apply records of previous costs to his estimated figures. His ability to read drawings must be unquestionable, and if the work is voluminous he should be accustomed to the use of the slide rule and the planimeter, as, by employing the latter instrument for the measurement of irregular outlines, and calculating their areas, greater accuracy is obtained in less time than is occupied by ordinary arithmetical computation.

Estimating Engineer's Notebook.—From a close scrutiny of the cost records of each component part, side by side with the detail drawings referring thereto, and from actual periodical observation of the jobs in progress in the factory, the estimating engineer will be able to compile valuable and useful data regarding the output of each tool in the machine shop, together with time taken for other classes of work in the various departments. With this, supplemented by his own personal experience, he will be able to readily arrive at a close estimate of what is possible of attainment in the various operations. Data of this description may usefully be recorded by diagrammatic curves, each curve being representative of one operation only on various ranges of jobs.

Est. No............ *Date*..................19......

Estimate to M ....

....

As per { *Inquiry dated* ....
{ *Drawing No.* ....

Details.	Rate.	Material.	Labour.	E. C.	Total.

FIG. 31.—ESTIMATE FORM. SIZE, FOOLSCAP.

The Preparation of Estimates.—The arrival of each day's inquiries from correspondence department, will be followed by a preliminary perusal and criticism of their nature, and any necessary consultation with the works manager will determine whether his department is capable of meeting the demands therein embodied. The manner of compiling the estimate so that each detail may ultimately be checked by comparison with the actual cost of the completed work, should such estimate be rewarded by acceptance, is conveyed in the estimate form described by Fig. 31.

This form is a foolscap book with an A–Z index for classifying the names of inquiring firms, each page being numbered and ruled in the manner described, and the respective value of material, wages, and proportion of establishment charges are shown separately in columnar dissections. It is recommended that the quantity, description, weight, and value of each item of material be set out first, followed by the calculated amount of time to manufacture each detail, with the rate and amount of wages payable thereon. Side by side with the wages amount is shown what establishment expenses will be incurred with the number of hours worked, each amount being written in the columns set apart for the purpose, as already mentioned.

Materials.—As to the calculation of weights of material, reference has already been made to the value of the planimeter for ascertaining the cubical contents of any part having an irregular outline, although by dividing such an outline into sections by imaginary lines and adding together the mean dimensions of each, a sufficiently accurate mathematical calculation is possible. The weights of standard sections of various metals per lineal and cubic measurement are obtainable from tables to be found in such engineering hand-books as Molesworth's, etc., which are quite too well known to require more than passing reference. Having noted quantities and weights of material required, the values will be ascertained by reference to such catalogues of prices as may be obtained from the library referred to in the chapter on contract department, although it is absolutely necessary to compile an independent record of material costs for use in the estimating department. These figures may be obtained from suppliers' invoices, and their compilation should form part of the daily routine of the department, so that all fluctuations may be placed on record. To this end a card index as Fig. 32 is essential, as by its use an alphabetical list of all bought materials is obtained, giving the date of each invoice which shows any variation in price from its predecessor, and also the name of the supplier. The cards are filed vertically in a wooden drawer with a capacity of about 1000 cards, classification of which is obtained by the use of guide cards with projections in three alternative positions.

Description ....
Stores Ref. No.......... *Class*.................
Remarks ....

Date of Invoice.	Supplier.	@	Cost.			Trade Discount.

FIG. 32.—STORES PRICES INDEX. SIZE, 5 IN. BY 3 IN.
Printed both sides.

Stores Ref. No.	Diam. × Length.	Type.			Black or Finished.	Metal.	Cost per dozen.	Supplier.
		Hd.	Neck.	Nut.				

FIG. 33.—BOLTS PRICES CHART.

A separate chart of prices for bolts and nuts, screws, etc., should be kept in preference to the above-mentioned index, as not only are they less subject to fluctuation but a record such as that described above, Fig. 33, is handier for reference. The diameter of the bolts determines the order of precedence.

Labour.—With the whole of the material now written up in the estimate, and under review, a survey of the drawings will suggest the various operations through which the parts will pass in their progress through the factory, and on which the labour cost is now to be estimated. Keeping in view the necessity for subsequent comparison with the cost accounts in the event of the estimate being accepted, the estimating engineer will find it useful to rule off a number of columns for the various operations, the columns to be headed with the titles of pattern making, moulding, forging, turning, etc. The items of material that require processing should now be numbered from zero upwards for use as a key to the various operations thereon. Referring now to his notes as to the time occupied on work of a similar nature, he will set out his estimate for the various operations and arrive at the total number of hours in each column, which he will transfer to his estimate underneath the list of material, fill in the rate paid per hour, and extend the labour cost into the column provided.

Establishment Charges.—The proportion of indirect expenses to be charged against each item of labour is much more a question of actual fact than one for conjecture, and its great significance is fully considered and presented in the subsequent chapter on costs department. No matter how closely the estimating engineer may approach to actual costs in the two factors already considered, he is absolutely impotent and helpless in his competition with contemporary firms if this third factor is left to take care of itself. Doubtless, the question may at times find a correct solution by ascertaining what is the percentage of the expenses in profit and loss account to the amount of productive wages paid in the factory ; but if that is taken as representative of either machining or any other operation alone, such a figure is altogether fallacious and worse than useless; and a momentary comparison of an expensive machine tool, its initial cost of installation and subsequent maintenance, with, say, the fitters' bench, will show that the statement needs no qualification. But, obvious though this is, there are very many firms who neglect its recognition in their estimates, with disastrous consequences. If, therefore, the procedure suggested in a subsequent exhaustive consideration of this much-evaded, though vitally-important, feature of modern accounting practice should appear laborious in its detail to the student of account-keeping, the necessity for a determined attack of the subject must be its justification.

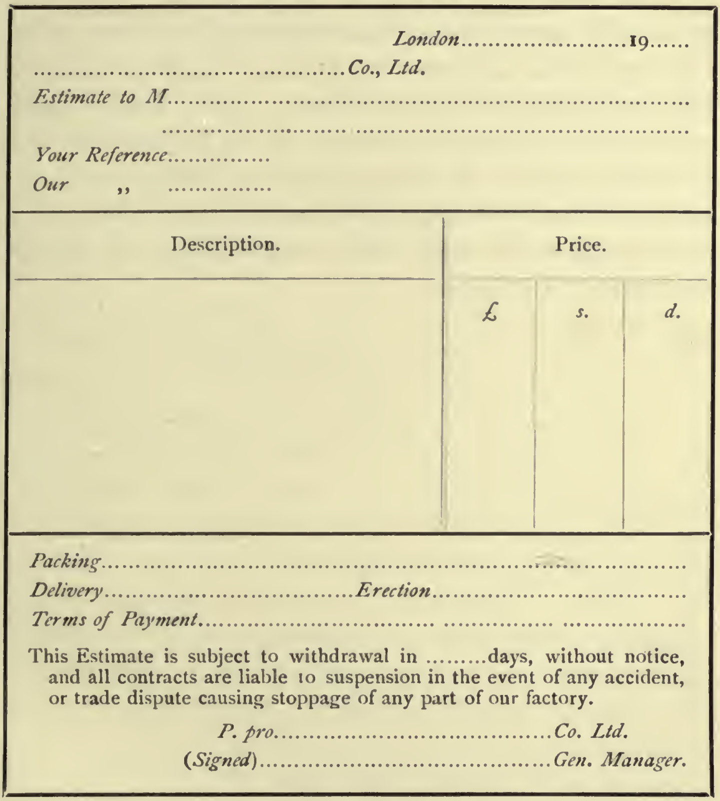
Delivery and Erection.—The question of delivery is one that embraces many important considerations, for out of this arise the questions of packing, home or export; nearest and cheapest route by which the goods can be despatched; cost of railway carriage; and, if for transport by shipboard, the amount payable in dock dues, freight and insurance will have to be taken into account, as also any cartage expenses between the point of delivery and site of erection. In estimating the cost of erection, provision must be made for any expenses that may be incurred by local conditions of an unusual nature, an example of which is the absence of facilities for lifting and unloading.

Terms of Payment.—In considering the matter of payment for any work to be tendered for, due regard must be paid to the reputed financial stability of each firm from which the inquiries emanate; and before entering into any contract involving considerable expenditure, inquiry must be made through the usual accredited sources of investigation. This duty is usually undertaken by the accounts department, and the matter will therefore be again referred to in a subsequent chapter.

Supplies from Outside Sources.—Should the necessity arise to invite outside tenders for any part of the work that may not, for any reason, be undertaken within the factory, it is advisable to intimate that such tenders are merely required for the purpose of estimating, as this will prevent much loss of time to all parties that would result from subsequent inquiries relative thereto. Such tenders should include free delivery, and be preserved on a file in their respective batches, indorsed with the number of estimate to which they have reference until the result of the estimate is ascertained, when unsuccessful tenders should be acknowledged and declined, giving the reason therefor, and returned to correspondence department for preservation in the ordinary manner. In considering the relative merits of such tenders, it should be borne in mind that the lowest is not necessarily the most tempting, for, as in the case of large forgings such as crank-shaft billets, gear-wheel blanks, axle beams, etc., any saving in price per cwt. or per piece may be more than absorbed by the subsequent cost of machining surplus metal off, to avert which reasonable conditions as to maximum weight allowed should be stipulated.

Form of Tender.—All tenders should be carefully drafted in clear concise language, accompanied by a fully detailed specification setting forth all outstanding and desirable features of design, nature and term of guarantee, etc., and should as far as possible be in strict conformity with the conditions and requirements of the inquiry. Whether a special estimate form be used or not—and it is preferable to do so—it is very desirable to have the estimate typed, on the ground of legibility, and a carbon copy retained for filing. The latter condition is very important on account of the liability of smearing if copied in a press-book ; and the conditions of the proposed contract should be fully detailed as in Fig. 34.

Following up Estimates.—In order to secure the fullest possible return for the expenditure of time and labour which a carefully prepared estimate entails, there must be an active, tactful, solicitous interest taken in its ultimate issue. During the period that must elapse between the despatch of an estimate, and the examination and comparison that will decide its acceptance or rejection, the fullest advantage must be taken of any opportunity for oral demonstration of such features as may be profitably emphasised, and no stone should be left unturned to secure by legitimate means that



London........................19......

....*Co., Ltd.*

Estimate to M...

....

Your Reference...............

Our ,, ...

Description.	Price.		
	£	*s.*	*d.*

Packing...

Delivery.................................*Erection*..

Terms of Payment.............................. ....

This Estimate is subject to withdrawal in ....days, without notice, and all contracts are liable to suspension in the event of any accident, or trade dispute causing stoppage of any part of our factory.

P. pro...*Co. Ltd.*

(*Signed*)..*Gen. Manager.*

FIG. 34.—TENDER FORM.

degree of confidence which must accompany final preference. Local circumstances will determine what necessity exists for positive action in this connection, and until it can be ascertained whether the result will be fructiferous or unfavourable, it is the duty of the estimating department to take due note of all estimates sent out, keep them under constant review, and follow up with such communications as may from time to time be necessary. Considerable assistance to this end will be obtained by the employment of a numerical chart of all estimates sent out, prepared similarly to that referred to in Fig. 19 for outstanding orders, which may be utilised for either direct communication or through the medium of salesmen.

CHAPTER VI.

ADVERTISING DEPARTMENT.

Effective Mediums of Publicity.—Modern advertising practice, as represented in the creation, drafting, and publication of the numerous striking devices whose mission it is to arrest the attention of buyers, convert their awakened interest into demands for information, and procure their enlistment in the army of users of the firm's product, is indeed an art whose worth is already recognised and established as an indispensable element of an up-to-date organisation. It is an art which finds expression in a judiciously-placed, incisive, rousing announcement in the trade periodical which has its circulation among the class of traders with whom business is sought through the agency of its eloquent appeal ; or, again, is presented between the covers of a well-bound, fully-indexed catalogue of carefully prepared data and well founded illustrations, combining a veritable storehouse of valuable information with a powerful demonstration of engineering triumph and lithographic talent. Such a volume is intended for long service and utility of a mutual character ; and not only is it accorded a frontal position in the engineering manager's library, but, fulfilling its office, is on frequent demand as a handbook of intelligence. Other channels through which the ability of the advertising agent finds expression are represented by the numerous useful articles of office equipment, all of which have their part in calling the attention of buyers to reliable sources of supply—silent but persistent in their appeals for a trial of the goods whose excellent qualities are thereon set forth. All these devices, whatever may be the outstanding features of their design and the manner of their presentation and distribution, have for their object an effective linking-up of the field of production with that army of users, on the extent and constancy of whose demands so much depends. In thus seeking public appreciation of what is produced by the combination of inventive mechanical ingenuity with the skill of the artisan, the necessity for attractive illustrations and artistic production has called in the skill of the engraver to co-operate with the work of the engineer. The effect of this is seen in the masterful woodcut representations of mechanical details, and the magnificent photographic reproductions that are rendered possible by the use of calendered papers with a highly finished surface. The aggregate cost of the necessary half-tone blocks, woodcuts, and electros which is entailed in thus meeting a demand dictated by competitive keenness for supremacy, even in the publicity department, and the fragile character of their surfaces which are so susceptible to damage by contact with other objects, necessitate the provision of suitable storage arrangements to insure a proper protection from accident. In some establishments there are on hand a large number of electros which, with their respective process-blocks and woodcuts, represent a considerable outlay, and ordinary considerations of economy demand that they shall not be permitted to lie about exposed in the careless manner so frequently observed. Moreover, it is particularly desirable that the whereabouts of any required block may be determined at very short notice, and the need is one that may be met in the manner described below.

Registration of Process Blocks, etc.—It is very desirable that half-tone blocks, wood engravings, electros, etc., should bear an identification number, and that they should be duly registered in numerical order for the purpose of location, for which purpose the use of a simple form of register similar to that described by Fig. 35 is recommended. The columns shown blank are to carry the dates when such blocks accompany an order for an illustrated advertisement, printed circulars, etc., together with the firm's initials, as "31/3/06, T. G. & Co., Ltd." and on the return of such blocks, the entry is struck out so as to indicate what blocks are in and out respectively. Should it be necessary to order special blocks, which will not be received until the expiration of the advertisement, an entry is made against the next vacant number, and the engravers are simultaneously instructed to number the blocks accordingly. This register has its counter record in the book described by Fig. 36, which is an ordinary ledger form, with

Nos. of Blocks.	To whom sent.					

FIG. 35.—REGISTER OF BLOCKS. SIZE, OCTAVO.

Name of Firm					
Date.	Nos. of Blocks.	Date retd.	Date.	Nos. of Blocks.	Date retd.

FIG. 36.—BLOCKS LEDGER. SIZE, OCTAVO.

numbered pages, and is provided with an A–Z index. Each page is headed with the name of the firm to whom the blocks have been loaned, and presents at a glance the date of each entry, the numbers of the blocks, and the date of their subsequent return ; and the utility of these two books will be at once appreciated by those who are acquainted with the confusion that results from an unsystematic handling of these details.

Blocks Illustration Guard-Book.—A properly classified illustrated list of all blocks representing the various specialities, and their different types, is quite indispensable to the advertising agent, who will frequently have to make a hurried survey and selection. The need is well served by a plain guard-book of the type used for the preservation of suppliers' invoices in the accounting department, the capacity of which will be determined by the number of illustrations to be contained within its pages. The book should be divided into sections, so as to provide a ready index to each particular class, e.g., " dynamos, open type, direct," pages 1 to 5 ; " dynamos, open type, alternating," pages 6 to 10 ; " motors, open type," etc. etc., and by either pasting in the respective pages, cuttings from advertisements, or " pulls " obtained from the printer, a very useful collection is obtained which will permit a rapid survey of the entire stock. Each page carries two or three illustrations with two columnar references, one for the numbers, and the other for a description, e.g. No. 1, half-tone ; Nos. 2, 3, etc., electros.

Storage of Blocks, etc.—The stock of blocks should be arranged numerically in shallow drawers having the two extreme numbers painted on the front, and should be protected from accidental damage by a soft wrapping. A cover of blotting paper for each block meets the need admirably, the ends being left open to enable the blocks to be withdrawn for reference ; and each cover has a numbered adhesive label for the purpose of identification. To prevent any unauthorised tampering it is advisable to provide each drawer with a lock and key, and by appointing one of the junior clerks as custodian of both the blocks and their records as described above, responsibility is confined within the narrowest possible limits.

LIST OF DAILY ADVERTISEMENTS

Month of..19............

Code Letter.	1	2	3	5	6	7	8	9	10	12	13	14	15	16	17	19	20	21	22	23	24	26	27	Date of Invoice.
A																								
B																								
C																								
D																								
E																								
F																								
G																								
H																								
I																								
J																								
K																								
L																								

(*Face.*)

Title of Publication.	Proprietors.	Contract.					Letter in Code.	Date cancelled.
		Dated.	No.	Term.	Once per	Price.		

(*Reverse side.*)

FIG. 37.—ADVERTISING CHART, DAILY.

Authorisation of Advertisements.—The necessity for written authority for the insertion of trade advertisements is very obvious, and it is customary to use the same form of official order as is issued by the contracting department, Fig. 16, which will show the number of insertions, name of publication, number and frequency of insertions, with price of each.

Record of Current Advertisements.—For the purpose of checking invoices for advertising contracts it is necessary to check and record each insertion as it appears in the respective publications, and invoices handed forward by accounts department will be "O.K'd" by comparison with this record. By reference to Fig. 37 it will be noticed that provision is made for a counter check with the rubber-stamp previously referred to under the remarks on contract department, to prevent a duplicate invoice for any one contract being passed through inadvertently. This describes a chart that may be arranged for insertions that appear daily, weekly, monthly, or annually, as occasion demands, and shows the state of current contracts at a glance, in a complete tabulated form with all the essential features of the several contracts; the number of inquiries accredited to each periodical may be noted in red side by side with the check of insertion as a guide to the value of such mediums for publicity.

CHAPTER VII.

ORDERS RECEIVED.

Their Careful Criticism before Acceptance.—The orders received from outside firms, whether of an oral or written character, will advisably first find their way to the general manager, in order that their nature may have due scrutiny. Anything extraneous to the scope and power of the company would be necessarily held up at its inception and features of special interest given due prominence. Perhaps the most important question involved in the acceptance of an order from a customer, is that of his financial standing referred to previously under the routine laid down for contract department, and the terms of payment should be such as to present no suspicion of hazardous speculation on the part of the supplier, a customary safeguard against which is found in "cash with order," or "on delivery," and in the case of goods for shipment, "cash against bill of lading" settlements. Acceptances of tenders to customers for the work will call for comparison of such acceptances with the respective copies of the estimates, and before the order is passed forward for entry and formal ratification, such outstanding conditions as price, time stipulated for delivery, penalties for breach of contract, and any proposed maintenance of the plant in working order for stipulated periods must receive official acquiescence. Having received the assent of the general manager, the orders are passed forward for entry in the order book, and their receipt duly acknowledged. In the drafting of a suitable form of record for orders received, due consideration must be given to the subsequent routine necessary for arriving at the ultimate cost of manufacture and the relation of such orders to sales department books. In the latter connection, it may be mentioned that the writer has personal cognisance of instances where a faulty system of accepting and filling orders has resulted in a total absence of the record in the sales day book; and if such an experience is to be guarded against, there must be an irrevocable rule established, that no work is to go forward in the factory except by the authority of a record in the "orders received" book.

Orders Received Book.—The form and nature of this official record of orders accepted, will be determined by the scope of the business carried on, and, among other considerations, the numerical strength of the clerical staff. It therefore follows, while it is quite possible to lay down the generally essential features of such a record, its precise form must depend on local surroundings and varying circumstances. The form described by Fig. 38, presents all the essential features and has successfully met all the demands which it was designed to meet, forming the necessary link between the accounting and manufacturing departments, and by the check which it possesses on the subsequent work of production and despatch of the goods, a due record of each transaction in the sales book is effectively secured.

This is a manifold carbon copying book of quadruplicate pages, size 8 in. by 10½ in., inexpensively bound between boards, and is provided with a separate A–Z index for reference to the various order numbers issued against the names of the respective customers. Each set of four copies bears an identical number at the top right-hand corner of the several pages, three of which are to be issued to the works manager, being consequently perforated, and the remaining copy preserved in the book as the office

Date...........19......

OFFICE ORDER TO FACTORY. *No.* 1.

Factory Order *No*..........	*Customer's Order* *No*.........	*Our Estimate* *No*.........

Despatch to ....
....
Not later than ....
Per ....
Mark packages ....
Invoice to ....
Remarks ....

Despatched ....19...	*Advice Note* *No*.......	*Invoiced* ....19...	*Sales Day Book* *Folio*.........

Quantity.	Description.	Price.

(*Face.*)

Goods in part completion.	Date of despatch.	Advice note No....

(*Reverse side.*)

FIG. 38.—OFFICE ORDER. SIZE, QUARTO.

reference. This alone is permitted to show the price of the contract for the information of the invoice clerk, and it will be remarked how comprehensive is the nature of the record. For insuring perfect legibility of each copy, a good carbon paper should be used, so that once writing will suffice, and transcription be avoided. The first step towards the completion of the office copy of this order is presented in the prescribed routine on the arrival of the detachable triplicate copies at the works manager's office, where one is filed away, the remaining copies being handed on to costs and forwarding departments, respectively. As head of the manufacturing department, he will cause inquiry to be made as to whether the order can be filled from stock, and failing this the work of manufacture will be commenced forthwith. The usual procedure in this connection, as it affects the drawing office, costs office, forwarding department, etc., is referred to fully in the subsequent chapters dealing therewith, and it is therefore sufficient to mention that the order clerk will ascertain from the costs department what manufacturing order number has been allocated to the office order, to which he may subsequently wish to refer in case any inquiries are made respecting probable date of delivery, cost, selling price, etc. His record of deliveries, either in part or full completion, is made from particulars supplied by forwarding department.

Confirmation of Receipt.—It is very desirable that all orders be acknowledged on the day of their receipt, and departure from this rule should only be permitted when the parts are supplied immediately from stock and their despatch duly advised. The practice is to adopt a postcard form of acknowledgment, printed in copyable ink with a vacant space for customer's reference, and the effect of the observance of this principle is the establishment of a feeling of confidence among the firm's *clientèle* and the elimination of any possibility of orders going astray, with vexatious results when the time of expected delivery arrives.

Preservation of Orders.—Having satisfied himself that the orders have been correctly recorded in his order book, the order clerk will promptly return the customer's orders and specifications to correspondence department, where they are filed away in proper classification as already described.

Specified Delivery Dates.—It not infrequently happens that the date mentioned for delivery is an important condition of the contract, and penalty clauses for default, with probable claims for satisfaction as to loss incurred by breach of contract, compel a careful observance of this important condition. It is the order clerk's duty to give due prominence to such a clause when writing up the order, and, with the aid of his diary, to see that due recognition is accorded to it in the factory.

CHAPTER VIII.

THE DRAWING OFFICE.

The Importance of Accurate Records.—It may confidently be asserted that there is no department of the factory where system and order are so indispensable as in the records of the designing and drafting department. Indeed, it cannot be consistently considered that there exists any real desire for a methodical grouping of records, unless there is evidence of it in the department where motion is first imparted to the producing energies of the factory. Here it is that the inventions of the master mind in engineering science find expression and interpretation, and the product of research and experiment is introduced to the skill of the constructor. The manner of that introduction is seen from the drafts of mechanical details devised by the engineer-designer, drawn up in accordance with mutually accepted principles, so as to render an intelligent interpretation possible without any degree of doubt or uncertainty. The function of the drawing office is therefore inseparably associated with the provision of records by which contact between inventor and producer is secured, and through whose agency the actual details of construction become a *fait accompli.* The question of method in this connection, not only in the manner of the creating of such records as may be necessary to this end, but also in the means adopted for ready location and accessibility, present and future, is affected considerably by local necessity and peculiarities of reigning conditions.

The extent to which such records will have bearing on the work of the future, the nature of the work to which they have reference, and the numerical strength of the staff upon which the work of compilation devolves, are all among the considerations to which due attention must be paid in the inauguration of system. And perhaps the last-named consideration is the one farthest removed from that of minor importance, for nothing is so fatal to successful organisation as an unreadiness to provide the help necessary for accomplishment.

Office Arrangements.—In considering the internal arrangements of the drawing office, it is very essential that due regard be paid to the personal comfort of the staff, for, from the viewpoint of profitable investment alone, the hygienic arrangements equally with the question of furnishing demand reasonable recognition. In this connection the proper heating, lighting, and ventilation of the office will alone secure that amenity of surroundings which is so essentially bound up with the necessary concentration of thought for real, effective work. The lighting of the office should be the best that circumstances will permit, and if the northern light can possibly be obtained through the agency of an overhead glazed roof, there will be little cause for complaint from the draughtsmen as to inconvenience caused by shadows and the tantalising rays of dazzling sunshine falling directly on their work. There should also be a plentiful supply of fresh air combined with a comfortably warm atmosphere, to avoid the vitiation of which the use of mechanically-driven ventilating fans is greatly in favour, and they are undoubtedly superior to the old-time automatic regulators. It cannot reasonably be expected that the necessary high standard of efficiency will be constantly obtained and maintained without proper environment, and if scant attention be paid to the question of proper housing, the effect will not be other than what may be expected from the jaded and oppressed feeling that is produced by confinement in an atmosphere impregnated with impurities, or indicating extreme fluctuations of the thermometer.

Apparatus and Equipment.—In considering the question of equipment and furnishing of the drawing office, the necessity for a private room for the use of the engineer in charge will commend itself as of primary importance. This room should be adjacent to, and overlook the whole of the office, and so arranged that perfect quietness is obtainable and freedom from undesirable interruptions. Here it is that the chief engineer can retire for private consultations with the draughtsmen under his direction, with departmental foremen from the factory, or representatives from other firms who may have occasion to call upon him, where conversation can be carried on without annoyance to the occupants of the outer office. With regard to the furnishing of the drawing office, it is recommended that each draughtsman be provided with a separate table alongside his drawing-board, upon which he may lay such drawings as he may wish to refer to from time to time. This table will be fitted with a drawer of ample capacity for the temporary custody of the drawings under reference, and with smaller drawers for storing instruments, colours, notebooks, etc., these being fitted with a good lock for privacy. Placed side by side with his table is each man's drawing board, which should, if possible, be of the adjustable and tilting type, upon the framework of which he may arrange his utensils conveniently for ready handling. This type of board presents many characteristic advantages over the fixed horizontal board. It adapts itself equally to men of different stature, facilitates the use of the square by its self-righting suspension gear, and, above all, overcomes the necessity for leaning in a cramped position over the board for long intervals, with all the injurious effects arising therefrom. This is, indeed, a boon to the busy draughtsman, and the initial cost of the outfit is more than justified by the increased efficiency and tone that accompany the use of this improved style of drawing-board.

Storage of Drawings.—Whatever arrangements for the storage of drawings may be dictated by local circumstances, the importance of prevention from accidental destruction by fire, is a point that demands careful consideration, and the cost of providing a fire-resisting strong room or safe should not stand in the way of its installation. Strange to say it is by no means unusual to observe a total disregard of this precaution, even where proper provision is made for the protection of account books from damage in such a contingency, and the only possible deduction that can be made is that the risk so undertaken is not fully appreciated. The drawings may be preserved for reference either on the numbered pigeon-hole system, in which each drawing has its own receptacle, or on the more general plan of laying them unfolded in drawers, each having a capacity of not less than fifty sheets. The drawers may be arranged in sections according to circumstances, each section being devoted to a separate type of machine, as may be indicated by a numerical or alphabetical classification, and the drawers labelled along the front to indicate which section of the machine is covered by its contents. Another plan which is in vogue among manufacturers of automobiles is to allocate a separate drawer to each type of car, the power or carrying capacity of the car being indicated along the front of the drawers, each of which has a distinctive number, the purpose of which is referred to in the remarks on drawing numbers.

The Preparation of Drawings.—The drawing office should be looked upon as the department through which are to pass all instructions to the factory, in so far as they affect details of design and construction, and where the record and history of each machine manufactured or modified are to be kept in accessible form; for, should this department be ignored in this connection, the resultant effect will inevitably bring to pass, sooner or later, a state of doubt and uncertainty as to whether such records as do exist are really representative of the machine to which they refer. The effect of such a chaotic condition of affairs as is produced by an absence of reliable data is deplorable and far-reaching; and customers are not slow to grasp the incompetency that is portended by the manufacturers' inability through want of proper records to supply any duplicate parts that may be required.

The first step towards the creating of these necessary records, following the works manager's instructions, is the preparation of working drawings for the guidance of the factory. Their nature and character will be determined by the class of work that is engaged in, but for the present purpose it is assumed that the output of the factory is confined to motor-car construction in considerable quantities. The drawings required are those for the use of the pattern shop, tool shop, forge, machine shop, fitting and erecting shops respectively, and the work evolving therefrom will be the manufacture of the several component details of the cars and of the special jigs required for their production, at a minimum cost and a maximum rate of output. With regard to the actual devising and perfecting of the necessary jigs, it may be mentioned that the duty usually devolves upon the foreman of the tool fitting shop, from whose suggestions and rough sketches the actual drawings are prepared. Drawings will also be required by the estimating department to meet inquirers' special stipulations, and by the contract department for invitation of tenders, but they are usually of such a nature as does not call for fuller comment. Although it is occasionally necessary, when re-designing a section of the car, to use a specially large sheet so as to obtain a full-size general arrangement, the rule as to standard sizes for drawings is one that should be strictly adhered to and enforced within reasonable limits.

Fig. 39 shows a " double elephant " sheet, 27 inches by 40 inches, divided so as to give four different sizes of drawings which are quite ample for ordinary requirements ; and in the standardisation of these alternative sizes, the subsequent filing arrangements should be such that drawings of varying sizes will not be contained in one and the same drawer, for obvious reasons. Too much emphasis cannot be laid on the desirability of having a sufficient number of detail drawings placed in the shops, as the loss entailed by a prolonged search for a missing drawing, when the supply is inadequate, is altogether out of proportion to the cost and trouble of printing, and justifies the contention that in this connection each man, or squad of men, should have his or their own drawing available. In preparing the shop drawings, therefore, whether of separate details or sections, due regard should be paid to this point, which in the matter of fitting and assembling, calls for a knowledge of shop

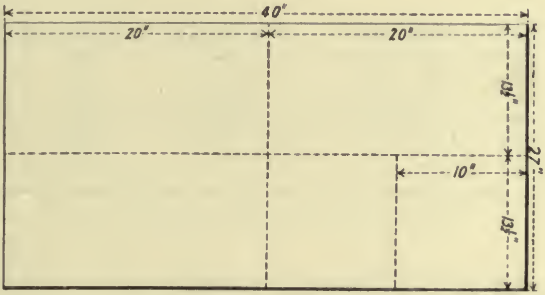


FIG. 39.

procedure and foremen's arrangements. On the completion of detail drawings for the shops, each part should be key-marked with a distinctive letter, and a list of the same set out, on the face of the drawing, as per the material list described by Fig. 40.

MATERIAL LIST.

Letter.	Name.	No. off. per car.	Material.	Pattern.	Ref. No.	Remarks.
A	Cam shaft	1	M. S.	—	301	To be hardened.
B	Forward cams, steam	2	M. S.	—	302	Ditto
C	Forward cams, exhaust	2	M. S.	—	303	Ditto
D	Reverse cams, steam ...	2	M. S.	—	304	Ditto
E	Reverse cams, exhaust	2	M. S.	—	305	Ditto
F	Collars for cam shaft..	2	M. S.	—	306	Ditto
G	$\frac{3}{16}$ in. taper pins... ...	2	M. S.	—	307	
H	$\frac{1}{2}$ in. nut	1	M. S.	---	308	

FIG. 40.—LIST OF PARTS ON DRAWINGS.

Registration of Drawings.—Before the drawing is passed on for tracing, it should be duly entered up in the drawings index, described by Fig. 41, and have its number, title, etc., clearly stencilled at the foot, as hereunder.

General Arrangement 10 *h.p. Chassis*, 31/4

Scale: 6 *in.* = 1 *foot.*

Drawing completed ....19......*A. W.R.*

Drawing checked ....19.........*F. T.*

The above number indicates that the drawing is No. 31 in order of sequence, and is allocated to drawer No. 4. If the strong room arrangements are for storing the drawings in pigeon-holes on the plan hereinafter described, the drawer reference will of course be ignored.

The "drawings index," Fig. 41, is a foolscap book forming a numerical index to all drawings made, whether they be of a special character or standard, and in the column for general remarks the number of any drawing that supersedes a former standard drawing may be recorded, at the time such drawings are recalled from the factory and marked as obsolete ; or again, in the case of drawings prepared for estimating purposes, or on the invitation of tenders for parts, the purpose for which such drawings are required will be stated in this column.

Progressive Number.	Drawer.	Title.	Type of Car.	Factory Order No.	Date Commenced.	Date Finished.	Remarks.

FIG. 41.—DRAWINGS INDEX.

Drawings of Separate Jobs, for Shop Use.—The registration of drawings to be issued for use in the shops, in which each job is described separately, is obtained by the "shop drawings register" as described by Fig. 42. This is also a foolscap book, the folios being numbered at the top corners for indexing purposes, and the first few pages of the book are devoted to the index, which is classified alphabetically. In the index, the various sections of the cars are ranged down the left side of the page, e.g., road wheels, rear ; road wheels, front ; axles, rear ; axles, front ; springs, rear; springs, front; under-frame, etc.; and on the left side are columns headed 10 B.H.P.; 15 B.H.P.; 20 B.H.P., etc., in which appear opposite the name of their respective sections, the folios on which particulars of shop drawings appear. It will be noticed that a column is provided in this book for recording the issue of the several drawings to the foremen, who will themselves initial each issue as an acknowledgment of receipt, and see that the return of each drawing ultimately is duly recorded. Whenever a drawing is recalled from the shops for supersession, the fact should be noted in the column reserved for remarks, in Index, Fig. 41. The manner of presenting each job to the shops is shown in Fig. 43.

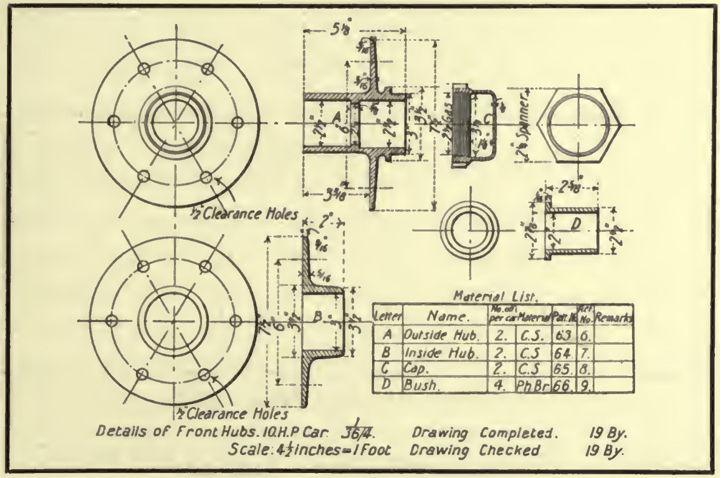
10 H.P. CYLINDERS. DRAWING No. 40/4. 4.

Shop Drg. No.	Description.	Ref. No.	Patt. No.	Date issued.	Recd. by	Date ret'd.
$\frac{1}{40/4}$	Cylinder body, C. I. ...	336	1264			
$\frac{2}{40/4}$	Cylinder cover, C. I.	337	1265			
$\frac{3}{40/4}$	1 in. gas plugs, brass	338	1266			
$\frac{4}{40/4}$	$\frac{3}{8}$ in. gas plugs, brass	339	1267			
$\frac{5}{40/4}$	Exhaust unions, M. S.	340	—			
$\frac{6}{40/4}$	Cap nuts, M. S.... ...	341	—			
$\frac{7}{40/4}$	Steam valves, M. S. ...	342	—			
$\frac{8}{40/4}$	Exhaust valves, M. S.	343	—			
$\frac{9}{40/4}$	Coil springs, M. S. ...	344	—			

FIG. 42.—SHOP DRAWINGS REGISTER.

It will be noticed that Fig. 42 is a detailed description of parts, and its value as a record of procedure for future reference as to details of construction of any particular car is invaluable; for as the "car specification" card index, referred to subsequently, gives the several drawing numbers, no difficulty will be experienced in determining the dimensions of any parts that may be required from time to time through breakage or wear.

Registration of Patterns.—Before the material list for the drawings can be completed in accordance with Fig. 40 it will be necessary to determine what numbers shall be allocated to the several patterns required for the foundry, for the purpose of future identification. The classification under Fig. 42 must have its counterpart in a numerical classification, each pattern receiving a distinctive number before the drawing leaves the hands of the draughtsman, and the pattern shop foreman should have instructions that the number so designated shall be carried on the pattern. In this connection metallic figures must be used on all patterns, as in this way alone can the numbers be satisfac-



Letter	Name.	No. off per car	Material	Patt. No.	Ref. No.	Remarks
A	Outside Hub.	2.	C.S.	63	6.	
B	Inside Hub.	2.	C.S	64.	7.	
C	Cap.	2.	C.S	65.	8.	
D	Bush.	4.	PhBr	66.	9.	

Details of Front Hubs. 10 H.P Car 36/4. Drawing Completed. 19 By.
Scale: 4½ Inches = 1 Foot Drawing Checked 19 By.

FIG. 43.—SHOP DRAWING.

torily transferred to the casting. Painting the numbers on the patterns does not survive contact with the foundry floor, and the stamping of numbers on patterns is equally ineffective for identification from the time castings are lodged in the storeroom. The "patterns register," described by Fig. 44, which is a foolscap book, gives the required numbers, and in the column for remarks will be carried any information as to supersession, alteration, or destruction. It will be noticed that there is a space for recording the factory order number under which each pattern is made. In the subsequent reference to costs department procedure, the routine for ascertaining the cost of making each pattern is fully described ; and if this order number is recorded in the register of patterns, the value of the same at the periodical balancing of accounts will be readily available.

Date.	Pattern No.	Description.	Drawing No.	Factory Order No.	Where Stored.	Remarks.

FIG. 44.—PATTERNS REGISTER.

Alteration of Patterns.—In designing a new car or reconstructing existing details of a car of standard type, the question may arise as to the economy that may be effected by altering the old patterns to suit the new design. The practice is one that offers distinct advantages, providing the only alternative to the alteration is to consign the old patterns to the boiler fire ; but the matter is one that calls for careful consideration. It must be remembered that there are cars on the road which have been built up from these old patterns, and that the alteration will result in embarrassing delays should replacements of broken castings be required on an occasion of breakdown. Another point worth noting in the same connection is, that altered patterns must bear new and distinct numbers, the old number being written off simultaneously with the issue of the new one, or the replacement of parts will inevitably be attended with complication and uncertainty when replacements are required. But whenever scrapping of old, discarded patterns is decided upon in order to make room for an increased stock, their destruction must be duly recorded in the "patterns register" for accounting purposes.

Alteration of Drawings.—Attendant upon the re-design of sections of the car, there is the question of recording the nature of the alteration on the face of the drawing. The necessity for such a revision may arise either before or after work has been commenced in the factory, and in the latter case there may even be cars, actually delivered and in use, in which the alteration of the design will, of course, not be embodied. The first point for consideration is the value of parts in stock—rough, partly finished, machined but not fitted up, or assembled and fitted and only awaiting requisition by the erecting department—and as it will have to be decided what is to become of such parts, the point is of considerable importance. It may be that the works manager will elect to place them in the storeroom for use on breakdown jobs in the repairs department, or again, to allow the work to proceed to final erection and delivery rather than have the disorganisation that would result from delay in getting the new design through; while, again, his decision may be to "scrap" the discarded parts in their entirety. If work has not been commenced at all on the revised designs, or if "scrapping" is decided upon, the drawings themselves may either be destroyed totally or their character altered as approved, without any record of the revision being necessary. Not so, however, if the work goes through, for both the old and the new designs must be preserved on record for future reference, with such clearness as to render their historic value unimpaired. As an example as to how this may be accomplished, we will imagine that the valve gear of, say, the high-pressure cylinder is to be strengthened, and that the engine as revised will differ in this detail from cars already delivered or approaching completion, being intended for delivery without alteration. When the scheme has fully matured and the details are drafted out, it will be necessary to place the alteration on record in the drawing office books and on the face of existing drawings. And if the alteration is to be embodied in cars that are at the time in progress, the drawings that are already in the shops must be recalled and corrected. The number of the new drawing will be the next unallotted number in the drawings index, Fig. 41, and in the "remarks" column will be written "superseding No. —." Similarly an entry will be made in the shop drawings register, Fig. 42, when the new drawing is ultimately issued to the shops. To complete the record a remark will be written against the old entry in both these books: "superseded No. —." And on the face of the obsolete drawings which show both the arrangement and details, respectively, the cancelling may be indicated by prominently writing the new drawing number in red ink in such a manner that, without destroying legibility, the new departure is unmistakable. Should this reconstruction affect the patterns register, Fig. 44, the alteration will be cross-referenced in similar manner to the record in the drawings index, as described above.

Customer's Special Requirements.—It frequently happens that orders accepted embody some special requirement of the buyer, which, though not in accordance with standard practice, must necessarily be described to the shops by a dimensioned sketch, prepared in such a manner as to leave a record of its character available for future reference. Such departures from standard practice are quite usual, and if the standard drawings were allowed to show each modification, the conglomeration of remarks would result in confusion and obscurity. The need is efficiently met by the use of a carbon-copy book with duplicate pages, lettered and numbered in the top right-hand corner for the purpose of identification, thus S. B. 1. This represents page 1 in the sketch-book, and alternative pages are perforated for issue to the shop, mounted in the manner to be described, the facsimile in the book being retained for office reference. The number of the standard drawing which is affected by this departure will be written underneath the sketch number, and the attention of the shop foremen will be called to the modification embodied in the sketch as circumstances may demand.

Tracings from Drawings.—Before the prints can be issued to the shops, the work of drafting must, of course, be followed by that of tracing and checking, and if the tracings are to be used as permanent records, the employment of prepared linen must be preferred to tracing paper for this purpose. The practice is to retain the tracings as office records, and if the original drawings are not required to record thereon any improvements that subsequent manufacture will show to be expedient, and which are intended to be embraced in later drawings, then they may be consigned to the boiler fire after the purpose for which they were prepared has been served, particularly if storage accommodation is scarce.

Checking Drawings.—That the work of checking the dimensions, etc., by comparison of general arrangement with details and of tracing with original drawing, is tedious and dull at times, cannot be gainsaid ; but the process is both important and essential. The custom of passing the work of one draughtsman on to another man of like standing cannot really be commended, as it is productive of a considerable amount of friction by provoking jealousy and antagonism between men of equal authority. Rather should the work be undertaken by a charge hand if the time of the chief draughtsman is fully taken up. The checker's first duty is to clearly understand what is required, and if the drawings intended for the shops are to serve their purpose, he must understand the men with whom he has to deal. All necessary views must be given, dimensions clearly expressed in bold figures, and the base from which the job is to be set out should be stated where expedient. Dimensions and calculations will require verification and the necessary clearances allowed for. Comparison with drawings index and patterns register must be made, and the material list carefully scanned for quantities, etc., and ticks should indicate that the various details have been reviewed before he attaches his signature at the foot of the drawing. Occasionally it may happen, in spite of the care with which this scrutiny is carried out, that a wrong dimension or some other irregularity will pass unnoticed, and in such case it should be clearly understood that the shops shall not work to scale nor proceed on verbal instructions, but that the drawing shall be promptly returned to the drawing office for correction. Verbal instructions as between the respective departments of design and production are an intolerable bugbear, undermining all efforts towards the inculcation of system, discipline, and etiquette ; and, by making it impossible to trace responsibility for resultant errors and misunderstandings, have a far-reaching influence of a discouraging nature. Under such conditions of working, zeal gives place to discontent, and harmony to discord, and the loss of time that is occasioned by unravelling the mischief wrought is considerable.

Prints and Photographs.—The necessary arrangements for supplying copies of drawings to the shops and the estimating and contracting departments respectively, will largely depend on local requirements, but if these are required in considerable quantities, the demand will best be met by including in the printing room equipment, a printing apparatus of the electrical type in preference to the old time unwieldy wooden frame. The use of the cylindrical glass frame and arc lamp represent the highest efficiency in this department, and, independent of the weather, yields a large number of prints daily in the hands of a mere junior. The printing room should be fitted up with drawers for storing the prepared photo paper, the top of which may be utilised as a cutting up and mounting bench ; and in addition to the usual provision of a lead-lined wooden tray under the water-tap, should be furnished with light racks for drying the prints. Heat will be required in this connection, and it is advisable to arrange for the moisture so set up to be quickly cleared by a suitable ventilator. Adjacent to this will be the dark-room for the development of photographic negatives, furnished with the necessary sink, a cupboard for chemicals, printing paper, etc., shelves for the negative-boxes, and the cutting-up table with its plate-glass top, light being admitted through a small, ruby-coloured, side window overlooking a small operating table.

Mounting of Drawings.—Assuming that the tracings are now to be prepared for storage in the pigeon-hole cabinets of the strong-room, the next duty is to mount them on wooden rollers at their top and bottom edges. These are of about $\frac{1}{4}$-inch round section, and sufficiently long to extend along the entire length of the drawing, being split to receive the same and held by small wood screws. One end of the roller is pierced for attaching a small tag thereto, on which is written the drawing number, so that a passing reference may be made without the necessity of removing the drawing from its receptacle. An appreciable advantage of the pigeon-hole system of storage lies in the ability to see, by a momentary glance, whether any of the drawings are not in their accustomed place, and the detection of missing drawings is thus far easier than by the alternative system of storing in drawers. In this way, the loss or unnecessarily long detention of the drawings, in conjunction with the system of issuing drawings as described in a subsequent paragraph, is effectively controlled, and the supervision of withdrawals by the chief of the department, is rendered less difficult. For the mounting of shop drawings, which is a very necessary and customary proceeding, the use of stout straw boards, having their corners protected from the effects of rough usage by shields of steel metal, is often preferred to the use of wooden mounts on account of the reduced cost and lightness. These may be obtained from any dealer of repute, and by a judicious use of clear varnish of white shellac and spirit over the face of the drawing, a really serviceable job is insured.

The Strong Room.—The importance of securing immunity from loss of drawings, in the event of a conflagration taking place, has been referred to in a preceding paragraph, and the capacity of the strong room must be determined by specific local needs for the storage of drawings, arranged numerically in pigeon-hole fixtures, or in numbered drawers classified according to the various types of cars. The responsibility for the work involved in issuing and securing the due return of drawings should be an individual one, and no drawings should be withdrawn except by a written request from the persons authorised to receive them. A simple form of requisition, bearing the description and number of the required drawings, together with the signature of the recipient, is all that is necessary. This form is retained as a receipt, to be exchanged for the drawing on its return, and not only forms a check as to the whereabouts of the several issues, but is an effective guarantee against unaccountable disappearance.

Shop Lists. — Accompanying the despatch of shop drawings for the manufacture of car details, a specification descriptive of the various parts will be issued to the shops for the guidance of the foremen. Fig. 45 describes a form of shop list which has successfully fulfilled all the requirements of both drawing office and costing department, and a full reference to its utility is made in the subsequent description of costs office routine. In the drafting of the various details of this list from the material list shown on the face of each drawing, it is necessary to ascertain how many cars are to be put through the factory under each particular factory order number. Such information is obtained from the works manager, and it is under his instructions that the cars are put in hand. The drawing office copy of these lists is contained in foolscap books for various types

Department.............................. *Sheet No*............
Shop Order No. .... *Date sent into shop*........
Class.....................

Quantity.	Description.	Card No.	Drawing No.	Pattern No.	Material.

FIG. 45.—SHOP LIST. SIZE, FOOLSCAP.

of cars, from which the shop copies are prepared by a typist under the direction of the chief cost clerk.

Drawings for Mailing, etc.—It is very necessary that a record be kept of all drawings sent out, in order that there shall be no doubt as to their character if any question on the point is raised afterwards. The record will have reference to drawings sent to fitters working on a breakdown away from the factory, to drawings accompanying estimates or invitations for tenders, and sketches sent to customers describing cars under construction for them. A foolscap book as described by Fig. 46 is all that is required, and an A–Z index giving name of firm and folios of each entry similar to an ordinary ledger index, completes the record.

Sent to	Address.	Drawing No.	Date.	Remarks.

FIG. 46.—DRAWINGS SENT AWAY.

Car Specifications Index.—The function of this record is to reveal at a glance the exact character of each section of the car as it leaves the finishing department, and any subsequent alterations and improvements made in regard to the various details while undergoing an overhaul or repair after breakdown. This is a record that was dictated by recurring complaints from customers, when ordering replacements under such circumstances as rendered it inconvenient or undesirable to despatch the car to the factory for repairs, and who indignantly complained of the delays that were the result of an absence of accurate records.

This record is a card index, giving unlimited scope for notes as to original design and modifications thereof by reason of the facility with which the cards can be replaced as they become filled, and is fully described by Figs. 47 and 48. The cards are of the "numerical tab" type, each

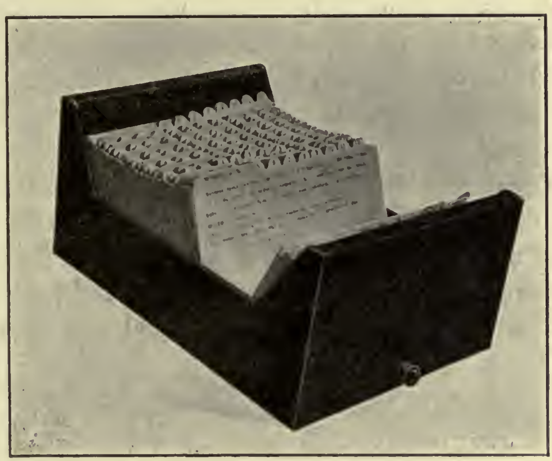
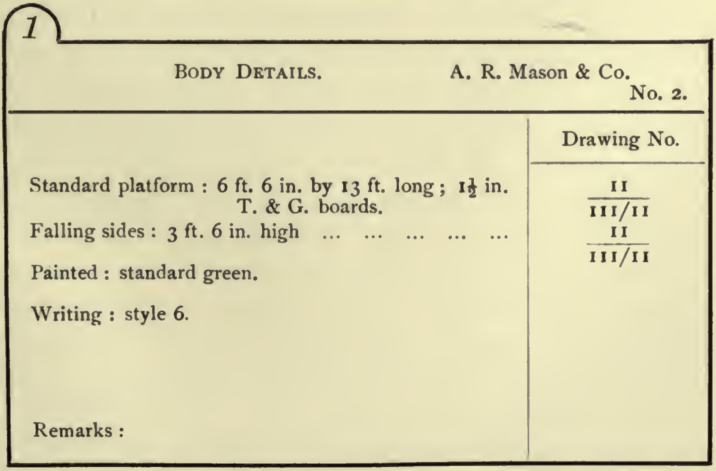


FIG. 47.—CAR SPECIFICATIONS INDEX.



1

BODY DETAILS.	A. R. Mason & Co. No. 2.
	Drawing No.
Standard platform : 6 ft. 6 in. by 13 ft. long ; 1½ in. T. & G. boards.	$\frac{11}{111/11}$
Falling sides : 3 ft. 6 in. high … … … … …	$\frac{11}{111/11}$
Painted : standard green.	
Writing : style 6.	
Remarks :	

FIG. 48.—CAR SPECIFICATIONS INDEX. SIZE, 8 IN. BY 5 IN.

section having a distinctive number as, for example, road wheels, No. 1 ; axles, No. 2 ; frames, No. 3, etc. ; and each set is preceded by a guide card bearing the customer's name, the same being arranged in alphabetical classification. The cover of the tray in which the cards are preserved carries a list of the sections and their corresponding numbers, so that if details are required respecting, say, the type of chains or chain wheels on any car, this list will give the section number, and the guide card bearing customer's name locates the card required. Needless to say, this class of record is of immense value, increasing with the age of the car, and in order to insure its reliability it is not only necessary that the drawing office be perfectly acquainted with the nature and extent of each repair, but that the writing up of each alteration shall be done with careful and systematic regularity.

CHAPTER IX.

COSTS DEPARTMENT.

Its "Raison d'Être."—In referring to the principles that underlie a well-founded system of cost-keeping, and describing the routine and procedure that may be suggested to meet established methods of production, it is not necessary in these days and in engineering centres to justify the existence of this important department. The very fact that there exists in so many engineering factories, widely divergent in their character both as to the nature and extent of their output, a system which has for its primary object the collection and classification of statistics relating to costs of production, may be taken as indicative of an official recognition that really reliable data of this kind are quite indispensable to a present-day administration. The first consideration among the many that enter into the subject of cost-keeping at a time of inauguration or reconstruction of methods is, the answer desired to what is undoubtedly an organised system of inquiry, which, to be successful, must at least be persistent and incisive. The object of the system may be the fixing of selling prices from the collation of figures obtained, so as to reduce or remove the risk of unintentional under-cutting. That the risk is a real one under existing conditions of keen, competitive trading is abundantly evidenced, but the difficulty is by no means insuperable. Or again, it may be desired to locate and eliminate sources of waste and leakage that are vaguely apparent in a comparison of total output with imbursements to the factory, an example of which is an excessive wages account. The utility of a system of cost-keeping must undoubtedly be measured by its availability for the reduction of excessive costs in whatever department of the factory they may be suspected, and this can only be obtained by arranging the statistics in such a form that minute dissection and comparison are rendered possible. These are objects that have received consideration in the subsequent exposition of actual practice ; and, though the routine as described is, in entirety, such as may only be attempted by a factory with an output of some volume, it is not at all impossible to curtail the routine without destroying its vitality or sacrificing any of the foundation principles upon which the system is constructed. It will be noticed that the system as described refers specifically to the manufacture of motor cars, and as even this branch of engineering is divided between the construction of light pleasure cars on the one hand, and of heavy wagons for the transport of merchandise on the other, together with the intermediate types which are represented by the omnibus and light delivery vans, it will be recognised that the procedure described will call for some little adaptation to meet the inevitable variations in design and local characteristics of internal administration. Criticism of the system will discover that the three component factors of factory cost are fully considered, these being represented by : (*a*) cost of the labour directly employed in the various stages of production ; (*b*) value of material represented by the various component parts ; (*c*) expenses of the establishment incidentally incurred, these being divided into two classes, viz., manufacturing and selling.

Engagement of Workmen.—Inseparable from the question of the engagement of employés, there is the ever-present possibility of incompetence and unsuitability of the many applicants for employment, that in some districts is by no means a negligible consideration. There is indeed a pronounced difficulty in this connection if the factory has been erected in a district to which the workers have to be imported, and the very existence and success of the business under such circumstances are largely dependent upon a judicious selection from the many applications that in a large undertaking are received daily. In such a contingency the "application for employment" form described by Fig. 49 is customarily recognised. This may be written up by the applicant himself either before or at the time of his engagement, which is entered into subject to the subsequent reference to his previous employer revealing nothing really unsatisfactory as to his character or ability as a workman. Such references are usually accompanied by a stamped addressed envelope for the reply, the application forms meanwhile being numbered seriatim and filed by the timekeeper, being attached to the previous employer's reply when received. With the engagement of each workman his foreman will advise the timekeeper on the form shown in Fig. 50, and the latter will assign a shop number to each man for pay-roll purposes, as the neglect of this point will result in inevitable complication in the cost

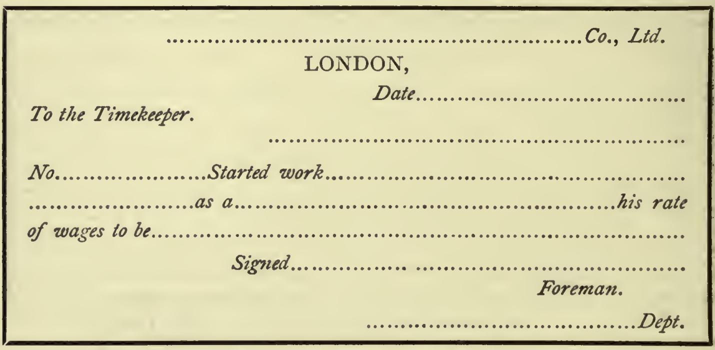
....*Co., Ltd.* *London.*
Date of application....................................19...... *No*...............
Name of applicant..
Postal address..
Kind of work desired..
Last employed by...
Reason for leaving..
How long employed...

FIG. 49.—APPLICATION FOR EMPLOYMENT. SIZE, OCTAVO.

records, and leave the man wondering why no wages are ready for him on pay-day.

The "new employé form" is cheaply bound in pads of fifty forms each, between paper covers, each form being perforated down one side, and a supply of the same is handed to each of the departmental foremen.

Time and Wages Office.—The task of checking the time of arrival and departure of a large number of employés is a very necessary duty that demands the utmost care and vigilance; and when it is remembered that the timekeeper's record constitutes the basis for the weekly pay-roll computations, it is obvious that his responsibility is one of no mean order. That errors will arise is incontrovertible, but there must be such a system of checking the calculations of time worked and wages due, that their detection is assured without relying upon the integrity of workmen to secure the refund of over-payments that would otherwise pass undiscovered.



....*Co., Ltd.*
LONDON,
Date..
To the Timekeeper.
....
No......................*Started work*..
..........................*as a*..*his rate*
of wages to be..
Signed................ ....
Foreman.
....*Dept.*

FIG. 50.—NEW EMPLOYÉ FORM. SIZE, 4½ IN. BY 4½ IN.

Mechanical Time Recorders.—It may confidently be claimed that an up-to-date system of timekeeping reduces the risk to very narrow confines, and the cost of installing time-recording clocks in preference to the use of metallic checks is abundantly justified. By their use a very considerable amount of time is saved by reducing the number of calculations that the work entails, combining a higher standard of accuracy with the elimination of unnecessary clerical help, and reducing wages disputes to a minimum. In the system to be referred to, it is assumed that the "Bundy Time Recorder" is the one adopted, in which case each man records the exact time of his arrival and departure by means of a small key which bears his shop number, the insertion of which in a slot or key-hole registers simultaneously both time and shop number through the agency of a self-acting inking apparatus and a revolving paper strip. These recorders may be suspended at the entrance of each department, or as circumstances may direct, and on each side of the machine is fixed a folding key-board carrying a complement of hooks, these being numbered so as to correspond with the keys suspended therefrom. Some few minutes before the time for commencing work the timekeeper unlocks the key-board, and immediately the men may register their arrival

....*Co., Ltd.*

Time Sheet for the Week ending............................190......

Ordinary time.

Name.	No.	F	S	M	T	W	T	Sun.	Lost time.	Ordinary time.	Overtime.							Total overtime.	Hours worked.	Added time.	Total.
											T	F	S	M	T	W	Sun.				

Fig. 51.—Time Sheet. Size, 20½ in. by 14 in.

in any order, transferring their respective keys from one board to the other in a constant procession. The timekeeper or his deputy is in attendance to see that only one key is transferred by each man, and as the insertion of the key in the machine automatically rings a bell, the check is simple in the extreme.

Timekeeper's Record of Readings.—Any late-comers and non-arrivals are duly noted, and the record slip is subsequently removed from the machine for the purpose of writing up the time sheet, of which Fig. 51 is a draft. This official record, compiled from the readings of the time recorder, has a capacity of fifty workmen's names per sheet, and, being written up after each meal-time, is an ever-ready reference to the current week's absentees and late-comers. The ordinary working day is divided into three sections for the remarks "IN" and "OUT," and figures are used to denote lost time.

Name.. *No*........................

Home residence..

Temporary residence..

Commenced.............. *Occupation*.............. *Foreman*.................

Left
Discharged }.................................. *Application No*.................
Suspended

Cause of leaving..

Remarks..

FIG. 52.—EMPLOYÉS' RECORD. SIZE, 5 IN. BY 3 IN.

Detection of Bad Timekeepers.—At the end of the week the totals are filled in for the guidance of the wages clerk. For the information of the works manager or departmental foremen the timekeeper prepares a chart showing the weekly totals of lost time on a "double

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elephant" sheet of drawing paper, ruled for the men's shop numbers and a fifty-two weeks' record, and thus assists in the detection of habitually bad timekeepers.

Record of Employés.—A very useful record, indeed an almost indispensable one, showing both past and present employés of the firm with the history of their engagement, is obtained by the card-index compiled as described by Fig. 52. The cards are arranged vertically in the usual form of drawer, being classified alphabetically, and facility of reference is obtained by guide cards bearing employés' names, the position of whose cards they locate. With the existence of such a record each man's previous history is readily available by reference to his application form, and the task of replying to inquiries from contemporary firms becomes one of small moment indeed.

....*Co., Ltd.*
LONDON,
Date..............................
To the Timekeeper.
Please pass out
.... *No*...................
at.....................*o'clock.*
Reason ....
Signed...
Foreman.
....*Dept.*

Fig. 53.—Pass Out Form. Size, 4½ in. by 4½ in.

Leave of Absence and Discharge Intimations.—The "pass out" and "pay off" forms respectively, described by Figs. 53 and 53A, are bound in pads exactly similar to Fig. 50. The first-named is self-explanatory, and its use is far preferable to verbal messages where leave of absence is frequently applied for. Before any wages are paid to workmen leaving the employ of the firm, the foreman should advise the tools storekeeper in advance, so that the return of the man's tools may be attended to. Bearing the storekeeper's signature, the pay-off form is handed first to the timekeeper to be indorsed with the number of hours payable, being checked and completed by the wages clerk, from whom it passes to the cashier.

..............................Co., Ltd.
LONDON,
Date..........................
To the Cashier,
Please pay..........................
No...............his wages up to date.
Reason ....
Class of Workman ....
Timekeeper.......................... No. of hrs..........................
Tool Storekeeper ....
(Tool Card Cleared)
Wages Clerk..........................Hrs. at.. ....£ : :
Signed..........................
Foreman.
..........................Dept.

FIG. 53A.—PAY OFF FORM. SIZE, 4½ IN. BY 4½ IN.

Time of Officials, Foremen and Clerks.—It is usual for the timekeeper to keep a separate record as to the arrival and departure of all officials, draughtsmen, clerks, etc., as a check against possible irregularities; but as the purpose is served by a small book with daily columnar rulings, the names being arranged down the left side of the page, it is not necessary to give a specimen draft. The record is placed before the general manager at short intervals, and the knowledge of its existence is usually sufficient to deter members of the staff from attempting undue liberties.

Making up Workmen's Wages.—The system of making up the men's wages is, in many of our most successful engineering undertakings, placed in the forefront as a subject of immense importance among the various considerations that enter into the question of economical and prudent administration. It has been strongly represented, and is becoming more and more generally recognised, that the fixed maximum pay system so long in vogue does not conduce to a maximum rate of output, even under the closest possible supervision from shop foremen, inasmuch as it offers no scope to the more expert workman, who is inclined to confine his efforts so as not to outdistance his fellow in the volume of work turned out. The differential payment system, to be described in this chapter, is based upon actual cost of the several parts as obtained from existing statistics; and the object of its adoption is, by increasing the earnings of each workman in direct ratio to his increased output of finished parts, to raise the aggregate value of general factory production without adding materially to the existing plant. Reference to the routine as to costing will show how the job card is employed to collect the cost of each operation on the separate details of the car, and from the data so collected, assisted by actual observance of the different jobs from the time of setting up in the machine tool to the finish of tooling, a really accurate calculation is possible on the part of the rate-fixer. In the fixing of the rate of pay for each operation, the tendency is to err, if at all, against the workman, as no reducing of rates should be permitted except on the introduction of jigs, etc., for improved manner of manufacture. It is recognised that any subsequent under-cutting in this connection will tend more and more to bring the system into disrepute among the workmen, and result in dissatisfaction, if not absolute failure; while it is an easy matter to adjust any prices that are obviously fixed too low. At the time of its inauguration, the system may be first explained to the men by type-written sheets, distributed among them gradually as the system is extended, and when they have had time to consider the new proposals, a shop meeting held for the purpose of explaining any ambiguous point. The following extract from these sheets will explain the principles of the system, and it will be noticed that the trade union rate of pay is recognised throughout, any additional bonus earned by the men representing an increased output, without a corresponding increase in such establishment charges as are represented by interest on value of plant and buildings, maintenance of same, chief rent, power, light and heat, supervision, etc.

Explanation of the Bonus System.—When a job is given out, a certain time is allowed for it. If the job is completed in less time than the time allowed, the workman becomes entitled to a bonus, varying in amount with the time saved. If the job takes longer than the time allowed, he will receive his regular hourly rate of wages, so that, no matter how short a time may be allowed for a job, the hourly rate of wages, at least, will be paid while engaged on that job, thereby preventing a bonus on one job being lost through failure to make a bonus on another. It will be evident from the above that, while the workman may increase his pay, he cannot lose money by the introduction of the system. The system possesses two main advantages :—

(*a*) It enables a workman to increase his pay by his own individual skill and effort, and the increase is added to his wages, the bonus being paid to the workman each pay-day along with his wages.

(*b*) The increased wages to the workman means also an increased output by the firm.

How the System may be carried out.—Fifty per cent.

of the time he saves on each job will be added, as bonus, to the amount of wages due to him on the time allowed.

(1) The time allowed for any job will be fixed by the management, and will be as near as can be ascertained to the time which would be taken on the job when working under the old system.

(2) The time allowed will include all the time necessary to procure tools, set up machine, and obtain materials for doing the job.

(3) A time allowance, after it has been established, will only be changed if the method or means of manufacture are changed.

(4) For calculating the bonus, the time taken on a job will include all hours between the starting time of the job, and the starting time of the next job.

(5) The hourly rate of wages will in all cases be paid for the hours worked. If a man takes longer to do a job than the time allowed, this will in no way affect the bonus which he may have made or may make on any other job.

(6) Overtime, night shift, and other allowances will be paid to the men on the same conditions as already prevail.

(7) In the case of overtime and night shift, the bonus will be calculated on the actual time worked, without taking the extra time due to overtime, etc., into account.

(8) If the workmanship when finished does not pass inspection, the workman will receive no bonus for that part unless he can make the work good within the time allowed, in which case he will receive any bonus earned.

(9) If any part turns out defective while being machined and is condemned, due to a flaw in the material, the workman will receive no bonus on that part (of course, he gets his time wages), but if he has several parts on the one job note, and one of them is condemned due to a flaw in the

material, he will still get the bonus, if earned, on the remainder.

(10) In cases of dispute the matter will be referred to the management, whose decision shall be final.

(11) Each workman on starting a job will receive a "job note," on which he will find a description of his job, the time when started, and the time allowed. When the job is finished, he will return his "job note" to his foreman.

(12) In the case of a job requiring the services of a squad of men, a time allowance will be fixed for the complete job. If the total time taken by the squad is less than the time allowed, a bonus will be paid to each man in the squad, varying with his ordinary rate of pay. The introduction of the bonus system will, doubtless, lead to the workmen suggesting improvements, devising better methods of doing many jobs, and pointing out defects in machinery and tools, and so justify the increased wages bill.

Fixing Time Allowance on Jobs.—As a simple illustration of how a time allowance would be fixed on a job for which no existing cost records have been previously obtained, we may take that of planing a cast-iron marking-off table, measuring, say, 6 feet by 5 feet. Observing a job on the machine, it would be found that the speed of the table was 21 seconds for one cut over a surface of 6 feet, with a return of 9 seconds, and the tool making 24 cuts per inch. Allowing for two tool-boxes on the cross-rail, and a margin for setting up, we calculate the time allowed for roughing and finishing, and put out a "premium job note," as per Fig. 54.

Premium Job Note.—The "job notes" are bound in carbon-copying books of 250 duplicate pages, numbered in the top right-hand corner, each alternate page being perforated, as it is to be handed to the workman doing the job. They are written out by the wages clerk when the job is put in hand, and his official copy is completed from its duplicate on the completion of the job, so as to show that the job is passed and delivered. The necessary figures relating to wages paid, or time worked prior to full settlement, are obtained from the "premiums ledger," Fig. 55, which the

PREMIUM JOB NOTE. No. 50.
.................................*Co., Ltd.* *London.*

..............................190......
Man's Name.. *Check No*..................

DESCRIPTION OF WORK.

....
....
....
Shop Order No...................................
Card No. ....

Date started......................190...... *Finished*.......................190......
Time allowed..................*hours.* *Signed*...
Managing Director.

....

Delivered to Stores.					Payments on Account.		
Date.	Quantity.	Description.	Passed by	Recd. by	Rate.	Hours.	Amount.
					Premium		

Note.—No premium will be allowed on parts that do not pass inspection, from whatever fault arising.

All parts will be delivered to stores and signed for on this note.

Premiums earned up to 5 p.m. each Thursday will be paid same week, providing this note is delivered at the office before 9 a.m. Friday, showing parts passed and received in stores.

Premium jobs not finished at 5 p.m. Thursday will be entered in wages book for payment on time worked, and the balance, with premium added, will be paid on completion of job.

FIG. 54. SIZE, 6½ IN. BY 8½ IN.

wages clerk posts up from the time charges collected in costs department. This is the ordinary ledger with A–Z index, as used for double-entry bookkeeping, and the specimen entries given below will suffice to show how it is employed.

This job has reference to shop order No. 2215, job card No. 430, and is in respect of premium job note No. 50, which was issued to the workman named, whose time and bonus amount to *6l.* 5*s.* While the job was in progress he received two weekly payments of wages at

Dr. A. Randall. No. 503. *Cr.*

1906	Paid.	Wages book.	£ *s.* *d.*	1906	Job.	Job note.	£ *s.* *d.*
Jan. 11	To wages on a/c.	50	1 15 0	Jan. 25	By $\frac{2215}{430}$	50	6 5 0
,, 18	,, do.	66	1 15 0				
,, 25	,, Balance	83	2 15 0				
			6 5 0				6 5 0

FIG. 55.—PREMIUMS LEDGER. SIZE, FOOLSCAP.

ordinary time rates, which the wages clerk posted in the "premiums ledger" from "wages book"; and on the completion of the job, the amount due to the workman in respect thereof was credited to him as above, and the balance struck, the amount of 2*l.* 15*s.* being passed through the wages book at folio 83. It will be noted that both the office copy of the job note and also that of the workman shows each payment of wages so as to agree with the premiums ledger. The wages book, Fig. 56, is made up to 5 p.m. Thursday in each week, and the work involved is such as to require both method and care, as only by systematic dealing can the duties be discharged with due promptitude and correctness. The men's numbers, names and hours worked, are obtained from the timekeeper's record, as shown in Fig. 51, and the amounts of wages due thereon are extended forthwith. Railway fares and other expenses due on outdoor jobs are obtained from "outdoor time sheets," as described by Fig. 57, and any premiums due and unpaid are obtained from the ledger.

Workmen's Wages and Expenses. *Week ended* ....19...

Shop No.	Name.	Hours.	Rate.	Wages.	Fares and expenses.	Pre-miums.	Total.

FIG. 56.—WAGES BOOK. FOOLSCAP.

The figures are verified by another clerk, and with the check that is obtained by the job clerk's figures in the workman's time sheets, described subsequently, the likelihood of errors passing unchallenged is remote in the extreme.

Payment of Wages.—Following the checking of the pay-roll, the wages clerk will prepare a list of sovereigns, half-sovereigns, silver and copper he will require, and pass the figures to the cashier, who will prepare his cheque on the bank accordingly. It is also very desirable that each

Telegraphic Address:

OUTDOOR TIME NOTE.

Nat. Telephone:

……………………………*Co., Ltd.*
London.

Time worked by……………………………
at ………………………………………………

Shop No.…………
M.O. No.…………

	190	Morning.		Forenoon.		Afternoon.		Night.		Travelling Time.	Total.	Particulars of Work.
	Date	From	To	From	To	From	To	From	To			
Thursday ..												
Friday												
Saturday ..												
Sunday												
Monday												
Tuesday												
Wednesday ..												
Thursday ..												

Time worked up to 5 p.m. Thursday must be shown; any time worked after that hour will be paid for the following week.

This note must be posted not later than Thursday night each week.

Railway Fares……………………
Board allowance……………… ..

Signed…………… ……………………
for………………………………………

FIG 57.—OUTDOOR TIME SHEET.

[*Printed on back of outdoor time sheet.*]

RULES.

Ordinary Hours of Working out of Shop.

In all cases where practicable the shop hours as set forth must be worked. The following exceptions, however, will be permitted: for six weeks before and six weeks after Christmas, when working in exposed situations where no light can be had, the workman must be on the spot (if not over one mile from the shop) ready to commence work, on Mondays at 8.30 a.m., and on Tuesdays, Wednesdays, Thursdays, Fridays, and Saturdays at 7 a.m., and must cease work on the first five days at 5 p.m., and on Saturdays at 12.30 p.m., with one hour's absence for meals on the Monday, one hour and a half on Tuesday, Wednesday, Thursday, and Friday, and half-an-hour on Saturday. If working over one mile, and under three miles from the shop, walking time will be allowed one way when working full hours.

Overtime out of Shop.

On Monday, Tuesday, Wednesday, Thursday, and Friday, from 6 to 8 p.m., or first two hours, shall reckon as *time and quarter*, same as in shop; after 8 p.m. on those days, all hours worked shall reckon as *double time*. On Saturdays, from 1.30 to 3.30 p.m. shall reckon as *time and quarter*; from 3.30 to 12 p.m. *time and half*; and after 12 p.m. to the usual time of starting on Monday morning, *double time* for all hours worked. Workmen commencing work at 6 o'clock on Monday morning, except in those shops which start work at 6 o'clock on Monday mornings, in or out of shop, will be paid *time and quarter* up to 8 o'clock a.m.; but if called upon to work overtime the same night, shall count as *time and half* from 5.30 p.m.

Rates of Extra Money out of Shop.

(*To be paid where working unless ordered to the contrary.*)

When working not exceeding three miles from the shop, men shall receive 1*s*. per day, and apprentices 6*d*. per day. If working over three miles and under 40 miles from the shop, men shall receive 2*s*. per day, and apprentices 1*s*. 6*d*. per day, and if over 40 miles 2*s*. 6*d*., and apprentices 1*s*. 6*d*. per day for every day made in ordinary working hours; and on overtime, not exceeding three miles from the shop, men shall receive 1*s*. per day, and apprentices 6*d*. per day; if over three miles, men shall receive 2*s*. per day, and apprentices 1*s*. per day, on actual hours worked, exclusive of extras. For Sunday, Good Friday, and Christmas Day, one day's board money shall be paid.

Railway Fares.

Third-class Railway Fares, where available, shall be paid each way once a week to parties working within 30 miles. If over 30 miles and under 60 miles, once a fortnight. If over 60 miles and not exceeding 100 miles, once a month. If over 100 miles, they shall then be subject to special arrangements.

workman should know what wages are calculated as due to him, and to this end the "Wages Slips," printed in copyable ink, as described by Fig. 58, are strongly recommended. They are arranged in perforated sheets of fifty slips each, copied in a press-copying book, and agreed in total with the aggregate total in wages book, which is handed on to the job clerk for labour cost purposes, the sheets taking the place thereof on the arrival of the cash from cashier's office. After counting this and arranging the various coins in stacks, the wages' slips are torn apart to be placed in small numbered envelopes or cash tins along with the several wages, arranged in numerical order on numbered wooden trays. The work is thus carried out silently and expeditiously by two men, and as there are none of the mistakes that "calling over" produces, balancing loses its terrors for the pay-clerk.

No.				No.			
Wages				Wages			
Fares and Expenses				Fares and Expenses			
Premiums				Premiums			
TOTAL.........				TOTAL.........			
No.				No.			

FIG. 58.—WAGES SLIP. 2 IN. BY 2 IN.

Wages Unclaimed.—Should any wages remain over unpaid through the absence of workmen, the pay-clerk must prepare a list of the same in an "Unclaimed Wages" book, and see that the signature of the recipient is duly obtained when claimed. Payments by proxy should only be made on a written request from the workman.

Apprentices' Wages.—In regard to apprentices and improvers, whose wages are subject to periodical advances with their advancing years, it is very desirable to adopt some means whereby the dates on which such advances fall due, shall come under review; and the accruing advances be brought under the notice of their respective

Name.	Shop No.	Dept.	Date of Birth.	Commenced.	
				Date.	Rate.
Baxter, S.	503	S			
Bedwell, R.	360	L			
Berry, A. L.	141	B			
Binner, C. E.	426	P			
Blackburn, J.	239	D			
Boardley, F.	271	F			
Brown, J.	199	C			
Brown, R. T.	330	K			
Burton, J.	472	S			

(*Right Side.*)

WAGES ADVANCED.								
Date.	Rate.	Date.	Rate.	Date.	Rate.	Date.	Rate.	
								B
								C
								D
								E

(*Left Side.*)

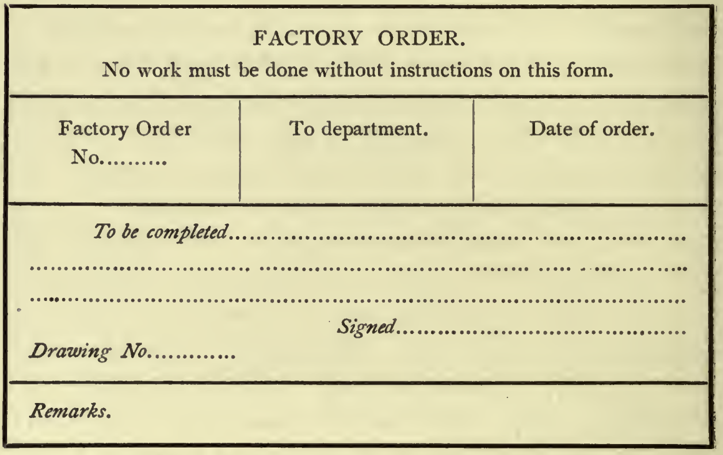
FIG. 59.—APPRENTICES' AND IMPROVERS' ADVANCES BOOK.

foremen for verification. There can be no diversity of opinion as to the importance of carrying out with promptitude any existing rule in this connection, and unless there is good reason for withholding an advance as punishment for breaches of regulations, etc., an apprentice will reasonably expect his increased pay at the recognised intervals. The "Apprentices' and Improvers' Advances" book and monthly chart, described by Figs. 59 and 60 respectively, may be relied upon for the necessary records, bringing the name of each apprentice under review with regularity, involving far less labour in the wages department than would result from an absence of system, and assisting very materially to promote that tone among the apprentices which a just and due recognition of their rights alone can produce. The book referred to is arranged for the classification of their names in alphabetical order, and the monthly charts are carried in a pocket at the back of the book. At each succeeding week the chart is consulted for any advances that have become due; with the sanction of the foreman the new rate, etc., is entered in the Advances Book simultaneously with the Wages Book, and old charts superseded and destroyed immediately they have served their purpose, so that at no time are more than thirteen charts carried in the pocket.

SEPTEMBER 1906.				
Name.	6	13	20	27
O. Williams	✓			
J. Brown	✓			
H. Hanson	✓			
J. Nichol	—	✓		

FIG. 60.—APPRENTICES' AND IMPROVERS' ADVANCES CHART.

Orders to Factory.—The routine necessary for compiling the cost records of jobs proceeding through the shops must very largely depend upon the system that is in vogue in the manufacturing department, not only as to the quantity of parts stocked and the system of putting the work in hand, but also in the method adopted in the assembling and fitting, and final erection. For it must be clearly understood that the costing system must be moulded and adapted to the factory; not the system of manufacture modified to suit the commercial department. This is a proposition that is associated with the elementary principles of factory accounting practice; but though it is quite obvious that to suggest the *raison d'être* of the shops shall be subscrvient to the statistician is altogether illogical and impossible, its recognition is by no means common or universal. It is in this connection that there must be unity and concurrence between the productive skill of the engineer and the mathematical ability of the organising accountant, and the result of the combination must be apparent in a perfect mutual understanding from the moment of issuing the order for manufactured supplies. Following the issue of drawings to the shops, and before any steps can be taken towards recording costs of production, it must be ascertained by what rule departmental operations are to be controlled. Doubtless until finality is reached in the "designing office," there must be some limit recognised in the manufacture of the many component details of the car, or it would inevitably result that some parts would become considerably overstocked and others not at call when required. The desire for economical production, that underlies the introduction of a wages bonus system, is also a determining factor in the decision as to what quantities of each part shall be placed on requisition, and in this matter the producing capacity of the factory is considered in relation to matters of finance and outside demand. For the purpose of justifying the system to be described, it may be assumed that, from a perusal of the office orders issued to factory, it is desired to put in hand twenty cars of a specified type, and that the necessary drawings for same have passed into the hands of the various foremen, simultaneously with the shop lists, a complete copy of which will be required respectively by the works manager, costs, stores, and contracting departments also. Under the direction of the costs department, whose duty it is to allocate job card numbers in the manner to be described, these lists are drafted from the drawing office copy and bound together in cheap files of the "Stolzenberg" type, by a typist, and handed to the officials concerned. Incidentally it may be mentioned that each foreman will mark his copy of shop lists with a "tick" against each batch of details as he gives them out to his men, and indicate delivery to "finished store" room by a "cross tick," so as to show the progress of the work.



FACTORY ORDER.

No work must be done without instructions on this form.

Factory Order No..........	To department.	Date of order.

To be completed..
....
....

Signed..

Drawing No............

Remarks.

FIG. 61.—FACTORY ORDER. SIZE, 7 IN. BY 5 IN.

Factory Order Forms.—All instructions to the factory for work to be put in progress are given in writing, whether the jobs be car repairs embodied in an office order, details of cars as per shop lists, or relating to the factory plant and fabric. The triplicate copies of the office order are handed by the works manager to his clerk, who retains one copy for reference and delivers the remaining copies to costs and forwarding departments respectively, where they are filed for future reference. Simultaneously with the receipt of this, the costs department prepares the necessary instructions to the foremen of the departments concerned, as shown in the form of factory order, Fig. 61. The necessary particulars are dictated to a typist, who prepares the required number of copies, which are pasted in the departmental order books, being checked and issued by the costs accountant.

Orders for saleable stock are distinguished from those having reference to establishment extensions and maintenance, by printing in distinctive colours. The office orders relating to the same are marked with the number of the factory order, and *vice versa*, for the purpose of identification. Stated briefly, the function of the factory order is the authorisation for work to commence on (*a*) batches of car details in accordance with the shop lists already referred to, for delivery to finished stores room; (*b*) repairs and replacements required by customers; (*c*) the manufacture and repair of patterns, jigs, and similar special requirements of the factory, with additions and repairs to existing buildings and plant in general. Mention of the order number is sufficient to enable the forwarding clerk to refer to his instructions on the office order as to the despatch of goods, and in the work of costing the same number is allied to a card number—identical with the reference number given on the shop drawings—for the purpose of arriving at the manufacturing cost of each batch of parts as set forth on the shop lists, which are drawn up in sections: as road wheels, axles, springs, frames, steering gear, etc.

Departmental Order Books.—The departmental order books in which these are affixed in numerical order, and folded so as to leave the number and date unobscured, are plain guard-books provided with an A–Z index, so that the various factory order numbers relative to each customer or establishment account can readily be located.

The Custody of Shop Drawings.—In view of the fact that the work involved is largely repetitive, particularly if the types of cars manufactured are few, it will be obvious that the shop drawings will be in repeated requisition so long as the particular type referred to remains standard practice. There must, therefore, be suitable provision made for locating each drawing, as it cannot be permitted that there shall be loss of time with machines standing idle while a prolonged search is made for the required drawing, neither should it be overlooked that a loose system of control opens the door for pilfering what is private and valuable information. The need is efficiently met by providing light wooden racks in which drawings of general arrangements are filed vertically within ready access of fitters and erectors, while the smaller drawings of details may be contained in drawers, conveniently placed, preferably in the vicinity of the marking-off table or gauging room, and arranged vertically in alphabetical order, the forge, pattern shop, etc., having their own separate arrangements.

The racks and drawers are under control, and the issue of the drawings is only permitted on the presentation of a printed slip, dated and bearing the name of the workman for whom the drawing is required, the same being filed away, as a receipt, until the drawing is returned and exchanged for the same. The calls for drawings are thus met expeditiously, without burdening the manufacturing department unduly, and responsibility for missing drawings is placed beyond the range of doubt and uncertainty.

Costs of Material.—With the issue of the factory orders and shop lists, the necessary material is withdrawn from the rough and finished stores rooms respectively, and work commenced in the factory forthwith. The requisitions are made in writing, and subsequently recorded in the "stores issued" books (Figs. 62 and 63) by the stores clerk, and, thence, in the stores ledger (Fig. 23).

Both the rough and finished stores issued records described above are loose sheets of foolscap size, having distinctive tints to assist the costs and stock audit clerks respectively in their work of posting, and are numbered in the top right-hand corner. They are contained in "Premier" files, so that any sheet may be removed when required without disturbing the remaining sheets, and possess a marked advantage over the bound book in that

Date.	Factory Order.	Card No.	Description.	Patt. No.	Weight. lb.	Value.			Stores Ledger.

Fig. 62.—Rough Stores Issued.

Date.	Factory Order.	Card No.	Description.	Origin.	Value.			Stores Ledger.

Fig. 63.—Finished Stores Issued.

the work of writing up the issues, and posting the same into both costs and stock records, may proceed, uninterrupted, among the necessary clerks simultaneously. The "finished stores" room is the repository for all details actually manufactured in the factory, so named to distinguish them from parts bought in, whether in the rough or finished; and sections of the cars that are assembled and fitted up in readiness for final erection are also herein temporarily deposited. As far as possible these finished parts are "tagged" or otherwise marked, at the time they are received, with the factory order number to which their cost has been charged, and when re-issued this order number is entered in "origin" column for the guidance of the costs department.

FOREMAN'S REQUISITION FROM STORES.

..................................190...

Please supply

....

....

....

....

Pattern No...*Class*.......................

Shop Order...*Card No*....................

(*Signed*)

....

Foreman.

FIG. 64.—REQUISITION FOR MATERIAL. SIZE, 4 IN. BY 4 IN.

Stores required by Foremen.—The form of requisition for material, shown in Fig. 64, meets all needs of the case. It is bound in pads of fifty duplicate pages, perforated on alternate forms, so as to allow a carbon copy of each requisition to remain with the foreman for reference, and it is on this form that the woodshop foreman, etc., will advise the head storekeeper as to material used which is not actually under his eye.

Material Overdrawn.—In considering the issue of material it must be remembered that bars for the sawing machines and automatic lathes, sheets for such details as bonnets and tanks, etc., will necessarily be overdrawn from time to time, for obvious reasons of convenience, and the surplus material subsequently returned. Fig. 66 is a "returns slip," to be handed into storeroom with scrap or surplus material, and the storekeeper's record of the same is shown in Fig. 67.

Schedule of Parts for Fitters.—The workmen's schedule of parts, of which Fig. 65 is a specimen draft, is the form of requisition used in the fitting and erecting shops. The schedules are drafted so as to conform with shop practice in regard to the assembling and fitting up of sections of the car, and the final erection of those sections, reducing the clerical work involved to a minimum, and not only display at a glance what parts have already been withdrawn, but entirely remove the possibility of careless

Schedule No. 36.
................SETS 12 H.P. OIL PUMP FOR ORDER................
Drawing No. 559/12.

Quantity.	Description.	No. per Car.	Card Ref. No.	Foreman's Sanction.	Issued by
	Pump body	1	476		
	Plunger	1	477		
	Crosshead	1	478		
	Packing gland	1	479		
	Gland nut	1	480		
	Locking piece for do.	1	481		
	Suction valve	1	482		
	Delivery valve	1	483		
	Valve chamber cap	1	484		
	Union for suction	1	485		
	Union for delivery	1	486		

FIG. 65.—SCHEDULE REQUISITION.

workmen obtaining duplicate supplies to replace parts lost or spoiled. The schedules are prepared by a typist on the "Mimeograph" copier, and issued from the costs department with the factory order.

MATERIAL RETURNED TO STORES.

To Storekeeper. *Date*........................190...

The following, drawn from Stores for Factory Order No............
Card No...............*has not been required and is now returned.*

DESCRIPTION.

....

....

....

....

....

....

FIG. 66.—MATERIAL RETURNED. SIZE, 4½ IN. BY 4½ IN.

DEPARTMENTAL RETURNS.

Month of..............................19...

Date.	Factory Order No.	Card No.	Description.	Weight, lb.	Rate.	Value.			Stores Ledger.

FIG. 67.—DEPARTMENTAL RETURNS.

Material Returned Form.—This form of advice as to overdrawn and scrap material returned to storeroom, is bound cheaply in pads similarly to those described by Fig. 64, and the record of such returns on the form shown in Fig. 67 is prepared from the above slips by the storekeeper's clerk for the purposes of the stock audit and the costs. Fig. 67 is a foolscap sheet, and is carried in a "Premier" file for preservation and reference.

Wasters and Spoiled Work.—It has already been mentioned that faulty castings, careless or incompetent workmanship, and occasional vagaries of machine tools, conduce to leakages and waste that, however unavoidable, should be discovered, exhibited, and inquired into promptly as they arise. Each factory order or schedule specifies what quantities will be required from storeroom, and the

WASTERS DELIVERED TO STORES.

To Head Storekeeper.

The following parts, machined to Order No.........., Card No..........,
are herewith returned as wasters, due to.......................................
....
....

DESCRIPTION—
....
....

Signed.......................................

FIG. 68.—WASTERS SLIP (TINTED). SIZE, 4½ IN. BY 4½ IN.

WASTERS RECEIVED FROM FACTORY.

Month of......................19......

Date.	Ex Factory Order No.	Card No.	Description.	Remarks.	Charged to

FIG. 69.—WASTER RECORD.

record of material issued shows when the authorised quantities are exceeded. The nature of, and reason for, such extra withdrawals should be ascertained before duplicate supplies are obtainable, and the necessary prominence is given to each case by the use of the "waster record," described by Fig. 69. This record is a foolscap book written up in the rough stores room from the foreman's "waster slip," Fig. 68, and is brought under the periodical notice of the works manager, who instructs as to the ultimate disposal of the wasters. The manufacturing cost of replacing the same is charged against the department concerned as an establishment charge, in accordance with a later reference to "standing order numbers."

FINISHED STORES RECEIVED.

Month of....................19......

Date.	Ex Factory Order No.	Card No.	Description.	Stores Ledger.

FIG. 70.—FINISHED STORES RECEIVED SHEET. SIZE, FOOLSCAP.

Finished Stores.—Before passing from the question of materials, reference must be made to the record of parts delivered to "finished stores" room from the various manufacturing departments; for if an accurate record is to be kept as to the stock of finished parts on hand, and which do not come under the head of "work in progress," it will be necessary to keep a similar account to that furnished by "finished stores received" sheet, Fig. 70. But while it is obvious that car details of such value as is represented by finished stores should be under close observation and control, it will also be readily conceded that, for the sake of convenience, there are certain units and fitted-up sections that may advisedly be permitted to remain outside the storeroom. Under such circumstances the storekeeper should be acquainted with the facts, and be nominally responsible for the records as to their subsequent disposition, as otherwise there is a real and grave risk that such parts will unaccountably disappear. Undoubtedly a lax system of stores control will result in such disappearances, which, traced to their source, would probably be found to arise from a car repair job, and the penalty paid for the laxity in this connection may be the gratuitous replacement of some very costly part. Only they who have actual experience can know how important this question is, and a conscientious experienced employé may easily save the amount of his salary by maintaining a keen look-out for leakages of this nature. But this record of "finished stores" received from the various departments has another important function, for the value of cost records depends entirely upon the necessary information as to what quantities are represented by the labour costs shown on the job cards. Reference to the latter will show that provision is made at the foot of the card for recording deliveries to the storeroom, and in this way the parts actually finished are compared with the rough material issued against each job.

Labour Costs.—The question as to how the actual time spent on the various batches of details may be correctly ascertained, is as complex as it is important, and the difficulties are all the greater when the task is to ascertain the labour costs on such numerous small jobs as come under the head of drilling, key-weighing, slotting, etc. With a bonus or premium system in vogue, and running concurrently with the time-rate system of pay for such jobs as cannot conveniently be given out on a bonus job note, the necessity for a reliable record becomes more acute, for it cannot obviously be permitted that a man may make capital out of one at the expense of the other job. Yet this is what may often occur unless the time charges are carefully checked. In some factories the foreman or his clerk have to perform the clerical work that is inevitably involved, while in others a clerk from the costs office makes a round of the shops once each day to collect the figures.

Various Methods of Recording Men's Time.—Some shop accountants permit the workman to write up his own record on a weekly time-sheet, and others prefer to have a time-sheet for each day. But a foreman is better employed when unfettered with this responsibility, and the figures are more satisfactorily obtained by a man not under his direction. To send a clerk on a daily patrol of the shops simply duplicates the work without insuring even reasonable accuracy. The daily time-sheet lends itself to veiled inaccuracies, while to put a weekly time-sheet into the hands of a workman reveals a palpably unreliable system, that merely results in a collusive, neglected compilation of figures that are intended to obscure his incompetence and delay the collection of the desired data. How then can the work be satisfactorily carried out, without placing too great a drag on the first duty of the factory, i.e., maximum production?

Mechanical Time Recorders.—One instinctively turns to the mechanical time recorder for a solution of the matter, and there is certainly much to be said in favour of the "Rochester Card Recorder." This machine is in many respects similar to the "Bundy" machine already referred to, and will serve 100 men admirably, showing results which make for both efficiency and economy, provided the department is not a scattered one. In the case of fitters, for example, of whom 100 may be employed in very close proximity to each other, the time of the squad could be ascertained by the use of this recorder with absolute accuracy by purely mechanical means and with the minimum amount of clerical co-operation.

Time Slips.—For a more scattered department, such as the machine shop or the erecting shop, the periodical visits to a time-recording machine would absorb too much time, and the work would be disposed of much quicker if a written time-sheet be adopted. The form described in Fig. 71 is one that has been found more uniformly satisfactory in actual practice than either the weekly or daily sheets previously referred to. The clerical work may be done by a job clerk in each department if desired, but, as a rule, it will be found that the turner or machinist has ample time for this after setting up his job. Each man is provided with a pad of fifty time slips, cheaply bound, and perforated for tearing off, which he hangs up close at hand. They are issued to him from the costs department, bearing his name and shop number—the work of a boy with a rubber-stamp.

Date, *20th July*, 1906.
Mr. *Adams* No. 336.
Stopped work on
Order No....................Card No....................at....................o'clock,
and started to *Rough Turn Shafts.*

....

For Order No. 3230. Card No. 571
E. H., Foreman.

FIG. 71.—TIME SLIP. SIZE, 5 IN. BY 3½ IN.

The first job of the week would be entered as in the form above, the order number and the card number (if any), written on the upper portion of the next slip immediately underneath, before tearing off the top slip for the foreman's signature. The slip is then placed in a box as the workman goes out for breakfast or lunch, as the case may be, and the box is afterwards cleared by a boy from the costs department. On finishing the shafts, the order number, etc., of which the workman entered on his time-slip beforehand, while his tool was taking its first cut, he will enter the time and date and set up his next job. His foreman will tell him the name of the job and its order number, and it is the work of a moment to note the same on his slip. In this way he reports the work of the week, and at stopping time on Thursday—which is usually recognised as week-end in the wages department—each workman places a time-slip in the box showing the number of the job he had in the machine at stopping time, which is identical with that on his next slip, which commences a new week. How readily the man grasps the idea will be proved by trial, and one prominent feature is that no mental calculation is asked for. Seeing that each slip is signed by the foreman, it will be a risky venture to attempt a false time charge, and the manner in which the slips are linked to each other is unmistakably a good guarantee that jobs will not be omitted.

Date Calendars.—It is very essential that the correct dates shall appear on the time slips, and as an aid to the men, light wooden racks are fixed in a conspicuous position and arranged to exhibit numbered cards, printed black on a white ground, to serve as date calendars, being changed each morning by a shop apprentice.

Management of Workmen.—In a work that is so closely akin to the internal administration of the factory, it will not be considered an act of trespass to refer to the efforts made in some establishments, to raise the tone and standard of intelligence of the men, by encouraging them to co-operate with the management by suggesting improvements in the shop system and equipment. Such suggestions are made in writing, and, in strict incognito as to their origin, referred to a shop committee for criticism. If adopted, their value is assessed by the committee, and money prizes paid each month for the best suggestions. Reading rooms for the use of the men during the lunch hour, and equipped with suitable periodicals, of which there is always a plentiful supply in the offices, are always appreciated under proper direction, and tend to enlist the interest of the men in questions of a practical character.

Technical Education of Apprentices.—The author has in mind a well-known, successful firm which is raising up an educated class of workmen, who will bear comparison with the *personnel* of any contemporary firm, either at home or abroad, and which, judiciously handled, will remain one of its most valuable assets. The apprentices are encouraged to attend the local well-equipped technical school, their fees and the cost of text-books, etc., being paid by the firm, prizes being offered to all who achieve success at the annual examination. The keenness and friendly spirit of rivalry on the part of the apprentices is very pronounced, their work of a very high order, and the well-meant intentions of the firm are appreciated very greatly. Undoubtedly it bespeaks an admirable spirit, and the mutual reward must follow as a natural sequence.

Official Labour Records.—Following the collection from the factory of the various time charges against the current jobs in hand, the time clerk prepares the official records of the same for posting against the respective costs accounts.

In this connection, the time sheet shown in Fig. 72 is recommended as a convenient, successful method of collecting each day's jobs in a weekly summary, preparatory to

Name.. *No*..................
Rate.......................... *Dept*.... ....
.....................................*Co., Ld., London.*
Workman's Time Sheet, Week ending..190.....

Factory Order No.	Card No.	Description of Job.	Machine Tool Nos.	Ordinary Time.						Total.	Overtime.							Added Time.	Total Over-time.	Gross Total.	Amount.		
				F	S	M	T	W	Th		Th	F	S	S	M	T	W						

FIG. 72.—WEEKLY TIME SHEET. SIZE, 8½ IN. BY 10½ IN.

checking the total time charges with the timekeeper's record, and the wages earned on each job with the total amounts appearing on the pay-roll, so that there need be little fear of incorrect postings in the costs records, with the attendant difficulty in balancing. Those who have experience of the worry and loss of time incurred in tracing such errors will appreciate the assistance that is afforded by this preliminary precaution. Bonus balances will be shown on the time-sheet against the various order numbers referring thereto, as also the time charges against outdoor jobs, with railway fares, board allowances, etc., so that a complete statement appears as to the time worked by each man, and the amount of wages earned.

JOB SLIP.

Shop Order No...
Card No...
For..
Class..
Drawing No...
Pattern No...

Men's Nos..........	....	....	....
Dates..........	....	....	....

Date completed..

This Card must be held by the workman who is doing the job. When he finishes the work he will hand this back to his foreman, along with the job to be checked.

FIG. 73.—JOB SLIP. CARD, 5 IN. BY 3 IN.

The use of loose sheets is far more advantageous than a book record of this character, in that the work can be distributed among two or more clerks, not only in the course of writing up from time slips, but also for comparison with the timekeeper's record of the readings taken from the

"Bundy" recorder, and with wages book. Then, when this balancing is found correct, posting into costs accounts is greatly facilitated by the suggested distribution of the work.

Job Slips.—The loss of time that is occasioned in a large office in consequence of the wrong order numbers that are repeatedly appearing on time slips and kindred records, is so considerable as to render the "job slip," Fig. 73, almost indispensable. The trouble of writing this is very insignificant as compared with that of clearing up such inaccuracies, and as the slip accompanies the job when given out by the foreman, the possibility of any misunderstanding between him and his men regarding the correct order numbers is very remote.

Foreman's Index to Work in Progress.—But the foregoing considerations do not exhaust their utility as an aid to the foreman, taking the machine shop as an example. The job slips are placed vertically in a wooden drawer of suitable capacity, and arranged by the foreman behind guide cards bearing the names of the various operations on machine tools—e.g. automatic lathes, boring, drilling, grinding, milling, etc. They enable him to see at a glance whether he has sufficient work in hand to meet the demands that will be made upon him during the day, and to make due provision, and assist him to keep in touch with the many parts both in hand and in abeyance. On the completion of the work to which a job slip has reference, its return to the costs department will be followed by due reference to the cost card, which is added and ruled off.

Cost Cards.—Reverting to the schedule of parts that is issued for the guidance of the departmental foremen, it will be remembered that each batch of parts is allied to a card number, which is referred to also in the job slips and the time sheets. In thus dividing up the sectional details of the cars, and marking the distinction between the different

Card....... .... *Pattern*.................... *Description*................. *Class*.........................

Shop Order............ *Drawing*.................. *Quantity*.................... *Material*.....................

Date.	Operations.	Time charges.			Labour dissection.									Labour Cost.
		No.	Hours.	Rate.	Lathe.	Drill.	Slotting.	Planing.	Wh'l Ctg.	Fitting.		Mark off.	Forge.	
Received Finished Stores				*Date* *No.*										

Material from Stores.					
Date.	Reference.	Description.	Weight.	Rate.	Value.
Selling Price	*Agency* *User*	*Material Cost* *Labour* ,, *E.C.* *Total Cost*			

(*Reverse Side.*)

Fig. 74.—Cost Card. Size, 5 in. by 8 in.

batches of parts, we are enabled to determine the cost of the various component details, and distinguish hubs from axles, gear wheels from their pinions, engine casings from cylinders, and so on; and from this subdivision to compile comparison costs with a view to throwing up into prominence any excessive or decreased costs that are disclosed by the cost cards, Fig. 74.

1

Factory Order No........for.........H.P. Cars. *Gen. Arrangement. Drawing No.......*

....

Card Nos.	Pattern Nos.	Names of Details.	Material.

Left-hand Page.

1

Name of Section .... *Gen. Arrangement. Drawing No.........*

....

Remarks.	Weight of Material.	Material.	Labour.	E.C.	Total.

Right-hand Page.

FIG. 75.—CAR COSTS BOOK. FOOLSCAP.

These cards are filed vertically in a cabinet of drawers, each of which is sufficiently large to contain 1000 cards, and guide cards are used for a numerical classification in the order of the card numbers. It will be noticed that the cost of material, taken from the storekeeper's record of stores issued and returned, appears on one side of the card, and the labour costs on the other are posted from the time sheet, Fig. 72.

Dissection of Time Charges.—There are also columnar dissections for the various operations, showing the number of hours represented by each as a first step towards the allocation of departmental establishment expenses; and the record as to deliveries to "finished stores" room shown at the foot of the card is obtained from the sheet referred to in Fig. 70.

Car Costs Book.—The cost cards in any one drawer constitute a full and complete record of the production costs of one batch of cars, not only as to details referred to in the shop lists, but also as to subsequent fitting and erection in accordance with schedule requisitions, the whole of that batch of costs being collected in the "car costs" book described by Fig. 75. The left-hand side of this book is virtually a specification in detail prepared similarly to the shop lists, the costs of manufacture being copied from the cost cards, and the remaining costs of parts procured from outside sources are obtained from a card index, precisely similar to that referred to in Fig. 32. A final summary of the sections of "car costs" serves the purpose of an index to the folios on which the various car sections are set forth.

Spare Parts.—In addition to the manufacture of the batches of details required to complete a specified number of cars, it is found necessary to put through extra parts as spares to meet the demands of wear and tear as well as of breakdowns. Such parts are manufactured on the authority of a job slip, simultaneously with the issue of which a cost card is prepared in the costs department and filed by order number classification, as each batch of such spares has a distinctive "S" order number. In this way the cards form a numerical index in themselves, and an "S" order book, ruled as Fig. 75 on the right-hand side, and with columnar rulings opposite for order numbers only, meets the necessity for a classification of such orders.

Establishment Extensions and Maintenance.—The various factory orders issued for the manufacture of new patterns, jigs, and other additions to plant and buildings, together with the repairs and upkeep of the same, are registered in an E. E. and M. orders index, which is a foolscap book arranged as an index and ruled in accordance with Fig. 76. It will be noticed that each job number is allied to a symbol indicating plant, buildings and fittings additions, works expenses, plant expenses, etc., and that a knowledge of accountancy is necessary in the clerk whose duty it is to allocate the job numbers.

PLANT ADDITIONS.				
Date Commenced.	Job Number.	For	Date Finished.	
				P.A.
				B.A.
				F.A.
				W.E.
				P.E.
				B.E.
				F.E.

FIG. 76.—E. E. AND M. ORDERS INDEX.

In suggesting the above index as a reference to the instructions given out, from time to time, for the manufacture of standard patterns, special tools, jigs, gauges, etc., the erection of buildings as additions to existing fabric, making new fixtures and fittings, with the necessary repairs and maintenance of the same, it is assumed that separate costs are required in preference to the practice, by no means unusual, of recording the costs without discriminating between one job and another—patterns being massed together in one account, for example. Often the designing and making of a jig is purely an experiment which may be chargeable to plant additions or plant expenses, according as it is successful or otherwise, and its entry in Plant Record as a unit of the company's assets, from which suitable depreciations will subsequently be written off, relies upon the correctness of the costs records. Instances of this necessity for separate costs might be multiplied in regard to patterns, foremen's offices, machine tools installations, fittings and fixtures, etc. The procedure is to issue factory orders tinted, as referred to in Fig. 61, for each job, the job numbers, commencing each year at zero, having the letters prefixed which indicate the account to which the work will

Factory Order......................
Job No. ....
Cost of
....

Date.	Description of Material and Operations.	Rate.	Material.	Labour.	E.C.	Total.

FIG. 77.—"E. E. AND M." AND "CAR REPAIRS" COST SHEET. SIZE, FOOLSCAP.

be charged by costs department. This job number takes the place of the card number which, as already described, is employed so as to obtain costs of car parts in detail. The factory order numbers being in accordance with the standing order numbers, referred to in the next paragraph below, will be repeated as often as occasion arises. With the issue of the factory orders, the required material will be obtained from storeroom, and the material and labour costs are recorded in costs sheets, contained in "Premier" files, and ruled as described by Fig. 77. This form of sheet, which is used also for recording the cost of repairs to customers' cars, has columnar dissections for the respective costs of material and labour, with the proportion of establishment expenses calculated on the number of hours worked. A list of daily issues and returns of material is herein entered by reference to the storekeeper's sheets, followed by a description of the work performed each week by the various men engaged, thus: "Turning and Boring Cylinders, No. 340, 25 hrs.," etc. It may be mentioned that customers' repairs go through under a factory order number only, the distinctions obtained by card numbers not being required.

Standing Order Numbers.—There are numberless small jobs performed in an engineering factory, particularly those of a general character, such as sweeping and cleaning, attendance to shafting and gearing, etc., which come round weekly with clock-like regularity, absorbing time and wages that must, of necessity, be charged up against an order number covering incidental expenses of manufacture. And there are jobs of varying value which affect the company's accounts of plant and buildings, and which it is desirable to exhibit in their respective accounts, so that not only may the company's true position in this connection be accurately shown, but that excessive expenditure may be localised,

STANDING ORDER NUMBERS.

Explanatory.

Plant additions comprise all extensions to existing plant, in so far as they increase the value of the company's property.

Building additions refer to similar extensions of the fabric only.

Fittings additions are such removable fixtures as foremen's offices, furniture, bins, and wooden structures generally.

Repairs, maintenance, and upkeep of the above are to be charged as expenses.

Note.—The department in which the expenditure is incurred must be indicated by the letter symbolical of that department, allied with the factory order numbers given below.

Factory Order No.	Description of Expenditure.	Account.
1	New standard drawings...	Plant
2	New standard patterns	,,
3	New jigs, gauges, templates, including cost of patterns	,,
4	New machine tools installed complete	,,
5	New gearing	,,
6	Electrical installation for light and power	,,
7	New services for steam, water, and gas	,,
8	New loose or small tools	,,
9	Half tone blocks, woodcuts, electros	,,
15	New foundations for machinery and other constructions	Buildings
16	General additions to fabric	,,
20	New fittings and fixtures	Fittings
21	Foremen's and other offices	,,
25	General labouring of miscellaneous character	Expense
26	Alterations to drawings and patterns	,,
27	Replacing jigs, gauges, templates	,,
28	Miscellaneous experiments	,,
29	Repairs to machine tools and gearing...	,,
30	Maintenance of electrical equipment	,,
31	Maintenance of steam, gas, and water services	,,
32	Maintenance of fabric	,,
33	Maintenance of roads and estate	,,
36	Painting, whitewashing, cleaning	,,
37	Maintenance and repair of fixtures	,,
40	Time of storeroom staff...	,,
41	Small sundry packing cases	,,
42	Scrap metals returned to store—sundries only	,,
43	Motor show expenses	,,
44	Maintenance and repairs of cars not chargeable... ...	,,
45	Sundry supplies required, insignificant details	,,
46	Wasters due to errors in drawings	,,
47	Wasters due to castings and material bought in ...	,,
48	Wasters arising from faulty workmanship	,,
50	Wages and salaries (staff)	,,
51	Management salaries, directors' fees, audit fees... ...	,,
52	Travellers' salaries, expenses and commission	,,
53	Royalties, patent fees, legal expenses	,,
54	Carriage and cartage, general, not chargeable direct against costs of production	,,
55	Postages, telegrams, telephone	,,
56	Stationery, printing, photography	,,
57	Trade advertisements	,,
58	Rents, rates, taxes, insurance	,,
59	Fuel, gas, water	,,

FIG. 78.—STANDING ORDERS FOR ESTABLISHMENT EXPENDITURE.

productive and unproductive wages properly shown, and any current order numbers guarded from surcharges in respect of work done on jobs that have no relation to the same. The E. E. and M. orders index, as will be noticed, is subsidiary to that of standing orders, having for its object the dissection of such costs accounts as are comprised in the list, Fig. 78, which includes all work incidental to the conduct of a factory, but not belonging to the trading scope, or saleable product of the company. Each of the departmental foremen is provided with a list of standing orders, which are to be quoted in stores requisitions and time sheets together with the job numbers, if any, for such jobs as costs department may require to be in detail. It should be clearly understood that such drawings, patterns, jigs, and tools, as are specially required to meet a customer's wishes, and are of no material value as standard designs, are to be charged against the cost of the car for which they are required ; and such small tools, etc., which, though standard, are of no value as assets of the company by reason of their insignificant "life," are to be charged through an expense account against revenue.

Foundry Costs.—It is by no means an unusual experience to find the complex subject of foundry costs dealt with somewhat hesitatingly and reluctantly, even to the extent of merely recording imbursements to this department, without noting the fluctuating output of aluminium, brass, and iron castings. Doubtless the position is somewhat problematic, owing perhaps, in some degree, to the fact that the moulder's time on a box containing a mixed assortment of small parts, whether in few or numerous quantities, is so insignificant in comparison with the time that would be spent by coremakers, moulders, and assistants on such heavy, and otherwise expensive, castings as are characteristic of foundry output in other branches of the trade. But it is very essential that the reign of doubt in this connection should not be permanent, and that approximate costs of all details, heavy and light, cored and plain, in brass and aluminium particularly, should be ascertained and compared with offers from outside sources; and if work be imported for the purpose of maintaining the foundry in full employment, the fixing of ultimate selling prices should not be a matter for conjecture.

Supplies of Metal, etc.—It is customary and desirable to charge pig iron and coke direct to the foundry through the storeroom book, to be placed in the vicinity of the cupola and drawn upon as occasion demands. Other metals for admixture in the brass foundry, and also the aluminium ingots, remain in the custody of the "rough storeroom" attendant, from whom they are requisitioned in the ordinary course. In the iron foundry a daily record is made by the foundry clerk, of the cost of charging the cupola, so as to show the total value of pig iron, scrap metal, and coke for comparison with each day's output of iron castings, and for the stock audit clerk's information. This record possesses no features of difficulty, and its form is not, therefore, to be described; but the foundry output book is outlined in Fig. 79. Under the direction of the foundry foreman, the

Date.	Full description (iron or aluminium).	Factory order No.	Card No.	Pattern No.	Weight.			Remarks.	Received Stores Room.	Entered Stores Ledg.
					c.	q.	lb.			
									190...	190...

FIG. 79.—IRON FOUNDRY OUTPUT BOOK. SIZE, 15 IN. BY 20 IN.

castings are divided into classes, indicative of the relative character of each as a guide to the proportion of indirect expenses, which each class must bear on being charged out to the machine shop. From the comparison referred to, as between the cupola book and the output of iron castings, the cost per cwt., for material only, is arrived at, being calculated on the weight of finished castings, without regard to their character.

Labour Cost.—The pay-roll of productive wages for this department is distributed over that week's output of castings in varying proportions to the classification referred to above, except in case of "specials," when the time of coremakers, moulders, etc., engaged thereon, is ascertained by the foundry clerk so as to arrive at their cost separately. This exception to the general rule applies to all castings of such a character that there is a considerable amount of time spent on the job, before and after "blowing." This clerk keeps a record of each man's time on the form of weekly time-sheet already described, on which the time spent on each "special" is detailed, the factory order and card numbers being written against the same for cost office information. Following their entry in the output book, all castings are delivered to "rough stores" room pending their requisition by machine shop foremen.

Foundry Expenses.—The establishment charges on castings include such general supplies as core materials, sand, loam, plumbago and general supplies, which are charged direct from suppliers' invoices to a standing order number, and in the E. E. and M. charges those for pattern shop are included. In addition there are the unproductive or indirect wages of assistants and foreman, and the losses through "wasters," which are also collected under standing order numbers. The aggregate total of these incidental expenses is distributed over the whole output, at a charge per ton of finished castings, so that there is no existing doubt as to what charges must accompany the subsequent distribution of iron castings from the storeroom.

Brass Castings.—The brass foundry output is recorded in a separate book, the classifications being yellow brass, special brass, and phosphor bronze. The required castings are put in hand on the authority of a factory order, but no attempt is made to dissect the labour costs, by reason of the insignificance of the car details that are comprised under these heads. The rule is to distribute the entire pay-roll over each week's output at a labour cost per lb. The cost of material is arrived at by charging from the store the component contents of the crucibles as they are issued during the week, and a rapid survey and weighing of surplus metal at week-end enables the necessary balance to be struck. All brass foundry supplies other than the metal used are charged as establishment expenses under a standing order, and distributed over the output at an establishment charge per lb., in similar manner to both metal and labour; and the three-fold classification enables a price to be fixed on each respective grade according to the costs of the three different crucible charges or mixings.

Deliveries and Returns.—It is of the utmost importance that dressed castings from the foundry and all returns of wasters and scrap metal shall come under the notice of the storekeeper. Failing the observance of this, accurate records cannot be expected, and a considerable amount of valuable stock is liable to be used on cars in hand for repair without the transfer being recorded in the costs sheets and sales books.

Storage of Patterns.—The arrangement of the patterns store is of equal importance with any phase of factory organisation, for under the nomenclature of patterns is represented a valuable collection of visible assets, the loss or damage of which may only be made good at considerable cost by reason of the high rate of remuneration that a good pattern-maker commands. Hence it may be urged that there should be due provision made for securing immunity from damage by fire and damp to both iron and wood patterns, with their core-boxes and other appurtenances. A well-appointed foundry has its underground vaults or overhead loft in close proximity. In the former case, the vaults are separated by fireproof walls, each section being lighted from overhead and furnished with numbered bins and racks for the custody of the patterns, to which access is obtained through wrought-iron, fire-resisting doors. The loft is often a less costly arrangement, situated, perhaps, over the sand store, and having compartments divided off by fire-proof partitions and wrought-iron, self-closing doors. The patterns are arranged according to their size and form, and an installation of automatic sprinklers makes the likelihood of their total destruction very remote should an accidental conflagration take place. With such a well-adapted pattern store, there is no reasonable excuse whatever for delay in finding any required pattern, and if the foundry foreman will take a personal interest in the storage arrangements, there will be no such delay. Each pattern has its numbered receptacle corresponding to the number on the pattern itself, and a simple record is kept in the form of a numerical list and description of the patterns, with their location in the storeroom, reference to which will discover the whereabouts of any required pattern. In a space for remarks, reference is made to the bin containing such coreboxes, etc., as are used with two or more patterns. When patterns are sent to outside firms, the contract department is expected to see to their ultimate return.

Pattern Shop Costs.—Timber: The various classes of timber purchased for patterns are, as in the case of the wood shop, handed over to the custody of the foreman, whose duty it is to advise the storekeeper as to withdrawals under the various factory orders, so as to be duly charged up against either an E. E. and M. account, or, if special, to the customer whose order calls for the manufacture of the pattern.

Labour, etc.—The wages paid in this connection are shown in the time sheets already referred to, and separate costs are kept of the various new standard patterns in accordance with the procedure described for Fig. 76, so as to facilitate the depreciation rating at stocktaking periods. The value so written off has its separate account in the departmental establishment charges, referred to fully in a subsequent chapter, which comprise all sundry supplies such as filleting, chaplets, sprigs, shellac varnish, etc., with all indirect or unproductive labour incurred by supervision and cleaning, and a proportionate charge for plant, power, and other incidental expenses. The general repairs to standard patterns are charged to a standing order number for redistribution as a departmental expense.

Marking Patterns.—Reference has been made to the importance of marking all patterns by metallic figures affixed thereto before being issued to the foundry. The numbers are obtained from the drawings, and the class of car to which the pattern belongs is indicated by letters symbolical of the respective types. A sharp impression is thereby left on the face of the casting, which is of very material assistance not only to storekeepers and shop foremen, but also to customers who may have occasion to order replacements of broken castings.

Wood Shop Costs.—The manner of arriving at the factory costs of spokes and felloes for the road wheels, and of the various types of bodies required to meet special requirements of customers, has distinctive features which it is desirable to explain.

Timber.—The classes of timber usually used in the manufacture of the wheels are ash, oak, and elm. It is assumed that the wood is bought in a "green" condition, either in the tree or in flitches, to be subsequently sawn up into rectangular blocks of the required dimensions, which are then carried off to the timber store, piled up in stacks, properly numbered and dated. After a lapse of about two years, during which time the blocks are subjected to the seasoning influence of a fresh, warm atmosphere, the blocks are returned to the planing machine and reduced to the required finished dimensions. The cost of the timber, obtained from the suppliers' invoices and recorded in the card index already described, is based on the price charged for flitches, so that if the timber is purchased originally in trees and delivered to a sawing mill, the cost of cutting up, approximately 10 per cent., should be added to the invoice price of the grower. The timber is stored under the direction and care of the woodshop foreman, who advises the storekeeper as to withdrawals for entry in the stores issued record.

Labour.—Work is commenced on the authority of a factory order, but the number of spoke or felloe blocks cannot be inserted until it is ascertained what quantity of satisfactory blocks the flitches will cut up into. A separate card number is allocated to front and back wheel spokes and felloes respectively, against which is charged the sawyer's time. The blocks are then transferred to the store for seasoning, the job slip being attached to the stack for future guidance. On re-issue for planing, turning, and tanging, the job slip shows the job number to which such supplementary work is to be charged, and with the completion of the work in this stage we are enabled to ascertain the cost of finished spokes and felloes in detail. These figures form the basis cost of the woodwork in wheels required for each batch of cars, and the wheel builder's time is obtained in similar manner to that of fitters and erectors.

Bodies.—The various types of bodies required for each batch of cars called for under a factory order, have separate card numbers, to which all material and labour must be charged, painting included.

Establishment Charges.—Standing order numbers are required for labourers' time, handling and storing the timber, and for foreman's supervision, to which are added interest and maintenance of plant and buildings, chief rent, power, heating and lighting, etc., in accordance with the routine subsequently described in reference to factory expenses in general on page 151.

Comparison Costs.—Previous references to the manufacturing costs of component parts have been made at some length in order that their utility for comparison and criticism may be fully apparent. The necessity for this minute dissection is two-fold: the fixing of selling prices for all parts, and the discovery of excessive costs, which would remain largely undetected if collected *en masse.* It is submitted that a keen management will consider a costs system somewhat unsatisfactory unless the work is undertaken as an aid to costs reduction, the medium referred to in the author's introductory remarks, by which economies are to be effected and the sources of leakage and waste effectively closed. In the card record described by Fig. 80 is shown the manner of collecting statistics for ready comparison, and as the figures are written up simultaneously with the completion of each recurring job, the result is a compilation of data that is always available and replete with up-to-date "live" matter.

Establishment Expenses.—The manner of allotting the

COMPARISON COSTS REGISTER.

Card No. 240. *Description:* Brake levers, pattern W. 853. *Class:* 40 H.P.

Factory Order.		Quantity.	Factory Cost.												Average Cost each.			Remarks.
Date.	No.		Labour.			Material.			Est. Chge.			Total.						
1905 June 22nd ...	680	20	0	10	4	1	13	2	0	12	3	2	15	9	0	2	9½	
November 10th	3134	20	0	10	7	1	14	0	0	13	1	2	17	8	0	2	10½	
1906 March 3rd ...	5199	40	1	0	1½	3	7	6	1	5	0	5	12	7½	0	2	9¾	Castings insufficiently annealed.

FIG. 80.—COMPARISON COSTS CARD, 8 IN. BY 5 IN. *Printed both sides.*

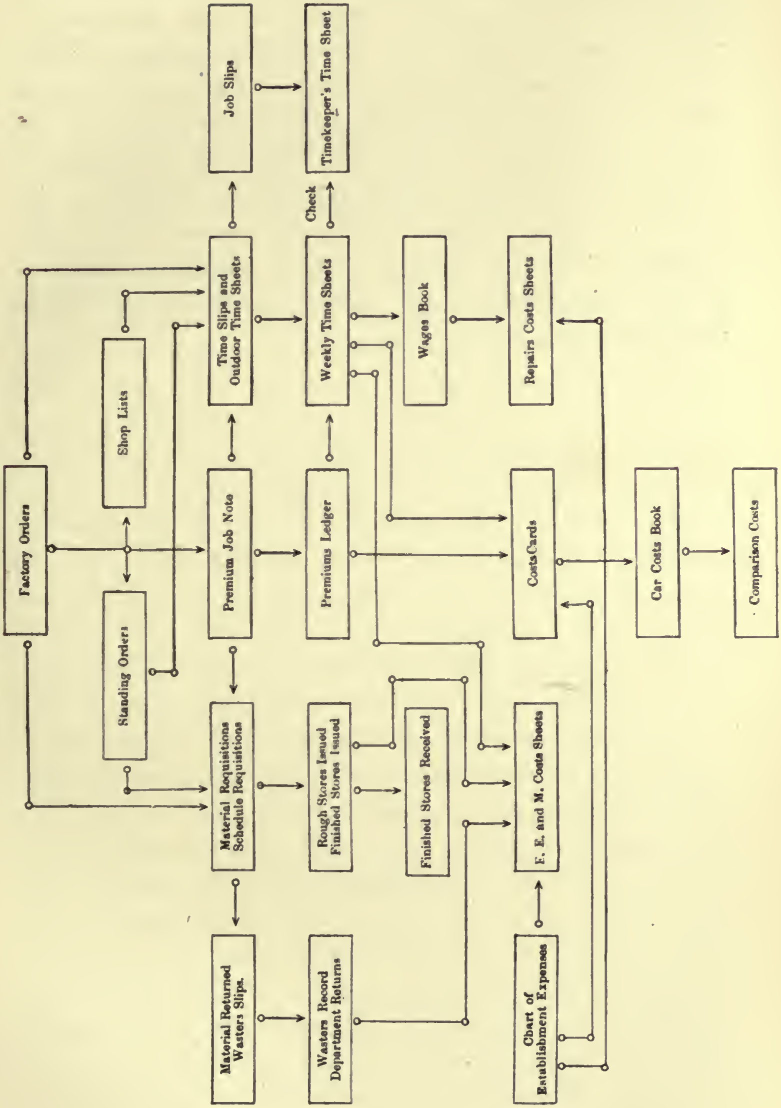
numerous expenses incidental to the administration of an engineering factory as they appear in a well-prepared profit and loss account, is a subject that demands most careful consideration. For no matter how closely an estimate or prime cost statement may approximate to actual expenditure in material and productive labour—and viewed in a reasonable manner such efforts cannot be more than a close approach to accuracy—there must still remain the undiscovered figure at which contracts may be entered into with a margin of profit confidently reserved. The finished machine may be all that human invention could devise and constructive skill successfully bring to ultimate completion; while columns of attractive figures may be produced to prove to what extent the elements of "prime cost" have entered into its construction; but unless it can be ascertained what are the indirect expenses of both manufacturing and selling departments, there is serious risk of offering the machine to an outside market at a lower price than will yield an adequate return on the capital involved in its production. This uncertainty is the rock upon which many a well-launched business has foundered, and wherever it prevails it must undermine the best intentions. There are certainly a number of exploited inventions in which there exists a monopoly of manufacture, and an ample margin may be reserved between prime cost value and selling figure, but in the construction of motor cars no such monopoly exists. Rather, the demand is one of reduced outlay on the part of the buyer, who usually holds claims as to superiority of design and construction at a premium. It may be that, knowing his position fairly accurately, the manufacturer may occasionally be prepared to make some sacrifice in order to prevent competitive firms from securing the hold upon the market that a desirable contract offers to the firm who shall secure it, and in such a case it is desirable not to under-estimate his ability to "cut." These are considerations of immense importance to the financier, in which the ability of the factory accountant must co-operate with the departments of production and distribution ; and if the clerical work involved places a burden upon the cost of actual manufacture, it must be held justifiable by reason of the loss that may be sustained by the alternative uncertainty in the sales department.

Manufacturing Department.—The principle of expenses allocation is one that depends upon past records of imbursements, obtained from periodical surveys of the accounts, upon which is assumed what amount of incidental expenses will be incurred within a period as yet unexpired. By reference to the list of standing orders, Fig. 78, it will be observed that the various transfers to profit and loss account include the cost of repairing and maintaining the departmental plant and other "real property" in a working condition, a class of expenditure that must not be overlooked in a review of general establishment expenses. Other equally important subsidiary items of profit and loss are the amounts of interest calculated at a pre-determined percentage on the value of plant, buildings, and internal fixtures, the reason for which provision will be conceded when it is remembered that, were these assets disposed of, and re-acquired at a rental, such a payment would assuredly figure in the account for rents, rates, and taxes. In other words, the original investors in the real property of a company are entitled to a return on their investment before subsequent holdings can receive a share of profits that may be earned and declared. This list of standing orders separates the expenses of one department from another, in order that the greatest may not be confused with the least ; for it would be obviously misleading to make the forge bear the burden of the machine shop, or alleviate the latter at the expense of the fitters. Each department is additionally charged with a due proportion of general manufacturing expenses, as, for example, chief rent, heating, lighting, power, etc., taken seriatim from the profit and loss account and written up in a tabulated form of account, the various columns of which are headed with the names of the various departments, the names of the several expense accounts being ranged down the side of the paper. Having distributed the whole of the expenses of manufacture among the departments in their due proportions, we arrive at the respective departmental totals for the period under review, which may be for a specified month, quarter, or year. These amounts are to be charged against the work that will be performed in the several departments, during an ensuing period of like duration, and in order that each employé, who is a producing unit in his department, may be considered in the liquidation of such expenses totals, regardless of the difference in wages ratings, the charges upon the factory take the form of an hourly burden. The manner of arriving at this hourly rate of establishment expenses is through the medium of a time chart which has columnar rulings for hours worked in the several departments, and the men's shop numbers are allied to the total hours worked by each man during the period under review. These figures are readily obtained from the weekly time sheets, and by a simple arithmetical calculation we find—number of men employed in actual manufacture in the department, multiplied by total hours worked by the same men equal "men-hours" per month, quarter, or year. The total amount of expenses incurred is the dividend, the number of "men-hours" becomes its divisor, and the quotient is the required hourly burden of departmental expenses which each hour of productive labour must bear for the ensuing period. In the case of machine tools of heavy calibre, the hourly burden is so arranged that their greater cost of installation and maintenance, and the larger proportion of power and floor space required, etc., are provided for on a graduated scale. From the above-described routine it will be remarked that the basis for a distribution of expenses is the labour involved in direct production, as being the dominating factor of prime cost. To this rule the foundry is an exception, as is mentioned under that head.

Selling Department.—The various expenses incurred by the sales department, examples of which are estimating, advertising, travelling, commissions and other agency expenses, demonstration runs, shows, etc., are collected from the impersonal ledger. From a comparison of selling expenses with the value of sales during the period in which such expenses were incurred, we are enabled to arrive at an amount per cent., to be added to total factory cost for the ensuing period. By this means every item of recorded expense incurred by both manufacturing and selling departments in a given period is liquidated by distribution over the prime costs of the various jobs in hand, and the debit or credit balance which is discovered by subsequently comparing the estimated expenses with the accountant's official statement of "profit and loss" at each periodical balance is carried down to the next account.

Weekly Labour Abstract.—A very necessary "finale" to the work of posting each week's labour costs is the summarising of each item appearing on the costs cards and sheets in an abstract chart. With the items of material, this check is not really required in the system as laid down, but if the clerical staff is adequate, there ought to be a systematic weekly check on the postings of labour as a guarantee that nothing has been omitted either by accident or design. To this end a large chart of "double elephant" paper should be prepared, with vertical rulings for the

DIAGRAM OF FACTORY COSTS ACCOUNTS.


Factory Orders
Standing Orders
Shop Lists
Material Returned Wasters Slips.
Material Requisitions Schedule Requisitions
Premium Job Note
Time Slips and Outdoor Time Sheets
Job Slips
Wasters Record Department Returns
Rough Stores Issued Finished Stores Issued
Premiums Ledger
Weekly Time Sheets
Check
Timekeeper's Time Sheet
Finished Stores Received
Wages Book
Chart of Establishment Expenses
F. E. and M. Costs Sheets
CostsCards
Repairs Costs Sheets
Car Costs Book
Comparison Costs

several order or card numbers. Each of these columns is subdivided for the men's numbers and the amounts of wages charged in the costs records, the aggregate totals being checked with the wages book. If any inaccuracy is discovered, there should be a note made on the face of the chart, and the costs accountant will then decide whether a scrutiny is desirable. This consists in comparing the amounts charged against each man's number with his earnings for the week under review, and the omission in posting thus discovered is readily traced on referring to the weekly time sheet.

CHAPTER X.

PLANT, BUILDINGS, ETC.

Forms of Record.—With a well-adapted tool store under proper control, it is usually considered sufficient to take a periodical inventory of such equipment as is represented by limit gauges, wheel cutters, stocks and dies, reamers, drills, etc., but it is very convenient, especially at the time of taking an inventory and fixing the amounts of depreciation, to have recourse to a plant ledger in which are recorded machine tools with their accessories, and fixed plant generally. The form of account described by Fig. 81 presents an intelligent record of each machine, with the outlay at its initial installation together with subsequent alterations, additions, and repairs, as are transferred from an E. E. and M. cost sheet. The amounts written off periodically for depreciation by reason of wear and tear, or reduced market value due to supersession by improved tools, are also shown at a glance. As a point of accountancy it may be mentioned that the cost of upkeep and repairs, and the amounts depreciated, must appear in the establishment expenses chart as a departmental expense. Each new machine tool is bought and invoiced in accordance with the routine described under contracting department, and the amount of the purchase is charged against the stores purchased account. The factory order is duly issued to the shops, and the cost of the tool, complete with its foundation and countershaft (if any). is recorded in an E. E. and M. cost sheet through the necessary mediums; and on the completion of the work of installation the following official record is made. Each machine with its accessories is the subject of an entry in the machinery inventory book, Fig. 82, and the progressive numbers allocated to the several machines are painted

Description: No. 2A Hexagon Turret Lathe, with pump, F.B.G. Auto Head, No. 140.
Maker: Alfred Herbert, Ltd., Coventry.
Bought from: Maker. *Date invoiced*............19......*Condition*: New.
Dr. (Left side.) (Right side.) *Cr.*

Installed.	Particulars.	Job No.	Amount.	Date.	Particulars.	Ref.	Amount.
	To cost of M/c and installation.				By depreciation.		

Bound here.

FIG. 81.—PLANT LEDGER ACCOUNT. SIZE, FOOLSCAP.

1

No. 7A. Hydraulic Tyring Machine. *No*.... *Plant Ledger Folio*......
....

Date installed.	Particulars of machine and accessories.

FIG. 82.—MACHINERY INVENTORY BOOK. SIZE, FOOLSCAP.

legibly on the respective tools. This inventory book is of foolscap size, inexpensively bound, and is only referred to at distant intervals in order to ascertain that everything is intact and in accordance with the plant ledger account.

Buildings Account.—The accounts for new buildings, and for repairs and maintenance of the same respectively, are recorded in the impersonal ledger. The former, as to original cost, are treated in the ordinary way through the medium of the subsidiary accounts books, and the latter through the medium of the E. E. and M. cost sheets which exhibit the whole of the items that enter into the costs of upkeep and maintenance. In the preparation of the periodical statement of liabilities and assets, the estimated depreciation is arrived at simultaneously with an examination of the details of repairs and alterations which tend to neutralise or increase the depreciation of such property.

Depreciation of Plant and Estate.—There is, perhaps, no duty that falls to the consideration of the board of directors of so complex a character as that of deciding what is a reasonable and proper allowance for depreciation in value of such assets as are represented by fixed and loose plant, buildings, and lands. An ocular survey of the estate will discover what apparent evidence there may be of spontaneous or natural decay, more or less rapid and pronounced, and varying with the efforts made to neutralise such depreciation by the usual methods of maintenance and renewal. By the principles of accountancy, it is demanded and required that depreciation, either sustained or accruing, shall be duly provided for out of revenue account, even though that account may already show an adverse balance from trading and profit and loss account. The duties and responsibilities of the directors of companies registered with limited liability, are specifically set forth in the Companies Acts; and it is clear that, while dividends may only be paid out of profits, any loss or depreciation of "fixed" capital does not affect the profits available for dividends, or render it necessary to make the same good out of income. (Palmer on "Company Law," ch. xvii., p. 157.) Table "A," Companies Act, 1862, enacts, "The directors may, before recommending any dividend, set aside out of the profits of the company such sum as they think proper as a reserved fund to meet contingencies, or for equalising dividends, or for repairing or maintaining the works connected with the business of the company, or any part thereof; and the directors may invest the sum so set apart as a reserved fund upon such securities as they may select." (Dividends, s. 74.) From the above it is evident that in this connection there is vested in the directors a discretionary power, and that the extent to which provision shall be made is determinable by the demands of the moment. But undoubtedly the *lex non scripta* of custom is that conceded by a desire to reserve out of profits that may be from time to time declared, a sinking fund of gradually augmented amount which shall be equal to the ultimate cost of replacing units of "fixed" or other property when the necessity for their renewal may arise. The rate for such depreciation is not, however, fixed or confined between limited bounds, and a correct viewpoint is difficult to locate. In actual practice it will be found, on the one hand, that while in some establishments the depreciation of a machine tool is rated according to its ultimate earning power to the factory as a going concern, there is, on the other hand, a tendency to write off its value in such a proportion that on its supersession by a tool of greater efficiency the machine may, as an obsolete encumbrance, be relegated either to the scrap-heap or to the mercies of a machine broker.

But there are certain guiding principles which may be regarded as a sound basis for a deliberation of this all-important question. The original cost of a machine tool with the added cost of installation—carriage, handling, building up in its foundation, etc.—may rightly be regarded as its initial rateable value, its value to the company as a working concern or to a purchaser with certain intentions; but, considered in the light of a forced sale for dismantling and dismemberment, the question assumes an altogether different form. The point is, then, what is its marketable value to an outsider; and if the machine is one that was specially designed to manufacture repetitive parts of a machine, this value may represent a very decided fall. And careful handling by a competent operator, proper attention to the necessity for cleaning and lubrication, with an absence of severity in taxing a machine to its utmost capacity, are considerations of material moment.

Buildings and lands represent a class of assets that is distinctly separate from that of plant, and their depreciation, if any, must be calculated to meet varying circumstances. Structures of iron will not be placed in the same class as the more substantial buildings of stone and brick, which are frequently maintained in good condition out of revenue account with little or no reserve for depreciation.

Fixtures and fittings are written off at a moderate rate, and the cost of their maintenance and repair charged direct to revenue, a distinction being made between selling and manufacturing departments for subsequent allocation to the costs accounts.

Drawings and patterns not chargeable direct to the cost of production of specific machines are frequently regarded as chargeable to revenue, an alternative practice being to treat them in the manner referred to in the standing orders for costs routine, writing off somewhat liberally from the original account and subsequent additions thereto.

Loose tools of such a character as do not add appreciably to the value of the company's assets by reason of their uncertain "life" must be charged direct to revenue as departmental expenses of manufacture. There is an excellent work written by Mr. Ewing Matheson, on the depreciation of factories, which is of a comprehensive character, and of which Part I. is particularly commendable as dealing very lucidly with the general aspect of diminishing value of plant and estate.

CHAPTER XI.

FORWARDING DEPARTMENT.

Its Relation to Accounts Department.—The duties that arise in the forwarding department form a connecting link between the factory and the invoicing branch of the accounts department; for with the passing of the form of advice shown in Fig. 83, accompanied by the despatch clerk's copy of the office order, we have an implied authority for an entry in the sales daybook, of which the customer receives, in due course, a copy on the official form of invoice. The routine described below, although very simple in its character, demands considerable care on the part of the despatch clerk, not only in carrying out the instructions embodied in the office order, but also recording each delivery in the delivery advice book. Reference to the routine as to invoicing will discover its utility in the subsequent work of billing, and any omissions of repairs and replacements will be detected on a comparison of the sales daybook with the costs sheets.

Advices of Delivery.—These advice notes are cheaply bound in manifold carbon-copying books of duplicate pages, one of which is perforated. The character of the advices is somewhat varied, comprising (*a*) new cars; (*b*) cars returned after repairs; (*c*) parts on loan whilst repairs are effected; (*d*) parts sent on approval; (*e*) parts replacing broken or worn out duplicates; (*f*) patterns sent to steel founders. Instructions as to the consigning of patterns are conveyed in a departmental memorandum from contract department, which will also instruct the patterns custodian to hand them to the forwarding clerk. In all the other instances cited, full instructions are found in the copy of office order, which has already been fully described. They are filed in numerical order, with the factory order number as the guide, and at the time parts are handed to the forwarding clerk for despatch, the quoting of this number is all the information that he requires. Many of the details are obtainable from the storeroom, and it is the duty of the works manager's clerk to telephone the necessary inquiry as to their procuration from stock, and to instruct the storekeeper

Telegraphic Address.......................... *Telephone No*.........

Our Reference is
F.O......................

No............

DELIVERY ADVICE NOTE.

.............................*Co., Ltd.* *London*......................19......

To ....

....

We have to-day despatched the undermentioned goods per.. Carriage........................ to..in accordance with your order.. Kindly advise the carriers as to any damage sustained in transit, and, pending an examination, accept delivery from carriers with due reserve.

....

Packages and marks.	Description of goods.

Be good enough to return empties, carriage paid, advising us of their despatch.

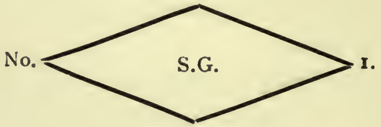
FIG. 83.—DELIVERY ADVICE. SIZE, OCTAVO.

on an order form. In case a customer's requirements cannot be filled from stock, a copy of the factory order is issued to the departments concerned in their manufacture, the parts being duly passed through storeroom for entry in the issues sheet.

Packing and Boxing. — The necessary packing and marking are supervised by the forwarding clerk, who is authorised to requisition from the woodshop any packing cases that may be required, the same being charged against the factory order number. When packing cars for shipment, the costs department will give out a card number allied to the order number, so that the cost of packing and delivery, if any, may be ascertained separately. A numerical register of all packing cases sent out to customers, of similar ruling to that referred to by Fig. 22, is kept by the forwarding clerk, the cases being legibly marked, and on their return it is his duty to advise the invoicing department so that the customer's account may be duly credited. For this purpose a foolscap book is employed, the form of which will be made sufficiently clear by stating that the columnar rulings are for the date of receipt, packing case number and name of consignee, these particulars being sufficient to enable reference to be made as to the amount charged for the same.

Cars, etc., for Foreign Shipment.—All goods intended for shipment to a foreign port are well protected from damage in transit by packing in tin-lined cases, and all bright parts protected from liability to rust by a generous application of such a preparation as Russian tallow and white lead, supplemented by coarse canvas wrappings.

Routine as to Shipment.—It not infrequently happens that clients will specify the route and steamship service by which they desire delivery to be effected ; but in the absence of such instructions, the shipping clerk will obtain tenders from the shipping agents, and ascertain the respective dates of closing and sailing. The invitation for tenders will, of course, be framed in accordance with the terms of the contract, which may include delivery at a foreign port, with all charges and duty paid, or, on the other hand, at a home port, inclusive of free delivery on board the vessel. In all such communications, it is necessary to state the overall length, depth and height of each case, and the number of packages to be shipped, together with their respective weights. Light, bulky packages are charged by cubical measurement at a price per ton, which, for shipping purposes, is calculated at 40 cubic feet; and on other packages the freight is calculated at a rate per ton of 20 cwts. It is customary to effect a marine insurance on this class of consignments, which, in the case of motor cars liable to damage by the action of sea-water, should be a W.P.A. rate, which includes all risks. On insuring "with particular average," a clause is inserted in the insurance policy agreeing "to pay average separately on each package or on the whole." Each case must be marked and numbered in legible characters for the purpose of identification, as, for example :—



Ceylon,
per ss. "Indiana."

and the marks of all packages, with a description of their contents, their overall measurements referred to above, and their gross and net weights, must be embodied in the form of shipping advice note.

Carriers' Instructions.—All goods despatched from the factory, whether for export or otherwise, are the subject of written instructions in the form of a delivery note, of which a duplicate is kept, which gives the date of despatch and name of railway company or firm of carriers, together with a description of the consignment and respective marks, the address to which the same is to be delivered, and stating who pays the carriage. An acknowledgment of receipt must, perforce, be embodied on the face of this note, in case any claim should subsequently be made for loss or damage.

Carriers' Liabilities.—The question of the liability of the carriers for any loss that may be sustained through wanton neglect or carelessness in handling, resulting in deferred delivery, damage, or total loss of the consignment, is of such importance to the consignor that an acquaintance with the Law of Contracts, as applied to "common carriers," is very advantageous. But the subject is of such a wide scope in its fundamental principles, that a lengthy reference is impossible in the present work. For a comprehensive and clear definition of the position, access should be procured to special works on the subject, of which "Stevens' Mercantile Law" may be confidently recommended.

CHAPTER XII.

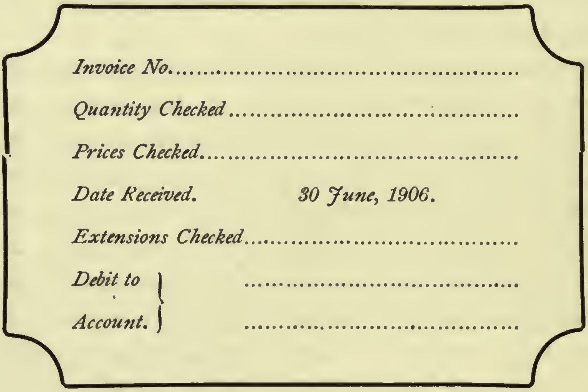
ACCOUNTANT'S DEPARTMENT.

Interlocking Nominal Accounts with Costs Accounts.—It is not intended, in this section, to enter into a consideration of the origin and evolution of accountancy, nor to attempt a theoretical exposition of bookkeeping principles; but rather to unfold, step by step, the routine and practice prescribed by custom and statutory demands for the regulation of the commercial department of an engineering business viewed from the accountant's side, and having regard to the system described in the preceding pages. It may be remarked that a considerable amount of controversy has taken place in the past, among professional accountants through the pages of "The Accountant" particularly, as to the practice of interlocking the trade accounts with those of manufacturing costs, which is, to a certain extent, both necessary and desirable. The question is largely concerned with the purchase and allocation of stores, and the cost of their delivery to the factory, the ultimate destiny of which cannot always be pre-determined with absolute certainty. In order to reduce bookkeeping routine to a minimum and to avoid duplication of the duties that fall to the clerical staff where the double-entry bookkeeping involved in keeping impersonal accounts, quite distinct from, and untrammelled with, the costing department's record of stores issued, it is urged that factory supplies are more advisably accounted for by charging to stores purchases account, and the costs accounts relied upon for the records as to their subsequent distribution.

An example of the ambiguousness that surrounds the question of factory supplies, in so far as they affect the nominal and personal credit accounts respectively, will be at once apparent when tested by the class of stores purchased for the woodshop and pattern shop. Obviously, it is quite impossible to say with confidence to what extent either sales, plant, or buildings will enter into their ultimate distribution, except by admitting the storekeeper's records thereof into the accountant's official statement. To this extent there must be an interlocking of the costs records with the trade books, combining accuracy with an absence of duplicated clerical routine.

Incoming Invoices.—The manner of checking and posting invoices for supplies and services to the factory, and of preserving them on record for distant future reference so that any single document can be made readily accessible, is a subject that merits all the care that may be bestowed upon it, for upon the inviolability and completeness of the records as to past and present creditors so much depends. The old-time system of pasting invoices in a guard book, whence they were posted to their respective ledger accounts, has been gradually superseded, probably because of the unwieldiness of such a volume ; and with the passing of that method it has become more and more customary to place the invoices in files, to which system full reference is made later in this chapter.

Manner of Checking.—In the section dealing with contracting department it has been mentioned that incoming invoices are marked by a self-dating rubber stamp, the utility of which will be apparent on reference to Fig. 84. Each invoice bearing the date of receipt is passed on to contract and receiving departments respectively, and when prices and quantities have been verified and initialled in the spaces provided, the invoices are handed to accounts department, where they are arranged in alphabetical classification in an A–Z file of the expanding type. With the close of each month a survey is taken of the goods received record, Fig. 21, and any overdue invoices are inquired into. The next duty of checking extensions is one that may be performed by a junior clerk, and is followed by a general scrutiny on the part of the accountant, who fills in the names of the impersonal accounts to which the total amounts are chargeable. Prior to the credit and debit postings to the suppliers' and nominal accounts respectively, the current month's accumulation of invoices are taken from the above mentioned file and transferred to one of the "Stolzenberg" type, in which they are firmly held by a flexible metallic clip, in undisturbed alphabetical classification and in datal order. Finally, the invoices are numbered seriatim in the space provided by the rubber stamp.



Invoice No...

Quantity Checked..

Prices Checked..

Date Received. *30 June, 1906.*

Extensions Checked..

Debit to ....

Account. ....

FIG. 84.—INVOICE INDORSEMENT.

Credit Notes.—It has been mentioned that all returns to suppliers are advised by a "returns note," Fig. 26, and the cancelling of the invoice received in respect to such merchandise is conveyed in the form of a credit note from the suppliers, such a note being employed also to correct any overcharges that may be discovered. These notes of credit follow the same course as the corresponding invoices, and after being duly checked and O.K.'d are finally bound in a similar manner to the invoices, but in a separate tinted cover, for posting to the creditors' ledger as a "set-off" against the charges to which they are relative.

Creditors' Ledger.—The purchases or creditors' ledger contains a summary of the class of accounts indicated by its title, showing at a glance the company's position with each respective creditor, as indicated by the names of firms with which the numbered pages are headed. These numbers are written on the invoices referred to in the preceding paragraph as indicating that they have been duly posted to their respective ledger accounts, and, customarily, creditors supply a statement of each month's account, of which the ledger clerk certifies the correctness before passing the same to the cashier for payment, bearing the number of the ledger account with which the statement has been compared. Fig. 85 describes the arrangement and form of each account, and as the ledger is provided with an A–Z index, any required account may readily be referred to.

Impersonal Ledger.—Thus far we have considered one view only of the accountancy routine arising out of the purchase of stores and of other services rendered to the factory —not, of course, in the manner that a student of rudimentary principles would desire to approach the subject, but in sufficient detail to meet the demands of the commercial engineer desiring to hold the "reins." There are, however, in a double-entry bookkeeping system both personal and impersonal accounts arising out of a series of contracts, the former being represented by the creditors' list and the latter by the accounts which have, metaphorically, received the various supplies and services. These accounts, of which

1 1

Firm: STEEL FORGINGS SYNDICATE, LIMITED, HAMMER ROAD, SHEFFIELD.

Remarks: Monthly terms 2½ per cent. discount.

Date.	Particulars of Debit.	Ref.	Packages returned.			Amount.			Monthly totals.			Date.	Particulars of Credit.	Inv. ref.	Packages returnable.			Invoice amount.			Monthly totals.		
1906. Aug. 15	CB. To cheque	1/ 350	—	—	—	95	12	0				1906. July 2	By Rr. axles	2963	—	—	—	31	5	2			
,,	,, discount	,,	—	—	—	2	9	2	98	1	2	,, 16	,, Crk. shafts	2964	—	—	—	25	10	0			
												,, 25	,, Sundries	2965	—	—	—	41	6	0	98	1	2
	(*Left hand*	*page*)							98	1	2		(*Right hand*	*page*)				—	—	—	98	1	2

FIG. 85.—CREDITORS' LEDGER. SIZE 12 IN. BY 19 IN.

stores purchases, advertising, rents and taxes are examples, are recorded in an "impersonal ledger," furnishing with the personal ledger accounts the "double-entry" term by which the system is known. Stated briefly, the personal ledgers merely show the company's position with outside firms; the impersonal ledgers are the medium by which the company seeks to ascertain and define its trading profits, its expenses of manufacture, and its capital investments.

Invoices Analysis.—The manner of arriving at these figures, which are inseparably associated with a declaration as to the company's position, is by a dissection and classification of each month's invoices in the tabulated form described by Fig. 86. The columnar totals are verified with the aggregate total for the month and posted to the debit side of the respective impersonal accounts, the ledger folios being written underneath each amount for auditing purposes.

In the above record it will be noticed that all returnable packages are separated from actual purchases, with the result that such items are brought under special notice, and any deferred returns periodically inquired into. Stores purchases account receives all supplies that will ultimately be issued to the factory in connection with additions and repairs to plant and estate. Such transfers from stores, being recorded in costs sheets, are entered in the E. E. and M. transfer journal in similar manner to the analysis described above, but on the form shown in Fig. 87. Carriage and cartage account is subdivided so as to indicate miscellaneous expenses incurred in this connection for the delivery of material received for manufacturing purposes, and for goods sold, respectively. Such amounts as are clearly chargeable to specific jobs by costs department are shown in this analysis charged to stores purchases as being the actual cost of the delivered material. The principle

1 INVOICES ANALYSIS, AUGUST 1906. 1

Invoice values.	Date.	Name of firm.	Folio Cr. ledger.	Invoice No.	Packages, etc., returnable.	Stores purchases.	Blocks, woodcuts, electros.	Painting, white-washing.	Audit fees.	Royalties, pat. fees, legal exp.	Carriage, etc. Miscellaneous.		Telegrams, telephone.	Stationery, printing.	Advertising.	R. R. & T. insurance.	Fuel, gas, water.	—
											Mfg.	Selling						

Binding.

Entries in red refer to Credit Notes received in respect of returns, etc., and the net total of each column is posted to the Impersonal Accounts.

FIG. 86.—INVOICES ANALYSIS BOOK. SIZE, 24 IN. BY 19 IN.

1 E. E. & M. TRANSFER, For the Month of..........................19...... 1

Cr. Impersonal a/cs.			Factory O/No. Standing O/No.	Dr. Impersonal accounts.													
Stores purchases.	Wages.	Manu-facturing expenses.		New patterns.	New jigs, etc.	New machine tools.	New loose tools.	Additions to fabric.	New fittings and fixtures.	Alter'ns to draw'gs and patterns.	Repairs to jigs, etc.	Gen. Labouring.	Experi-ments.	Repairs to machine tools, etc.	Mainten-ance of fabric.	Repairs to fittings.

Binding.

FIG. 87.—E. E. & M. TRANSFER JOURNAL. SIZE, 10 IN. BY 15½ IN.

herein involved is the reduction of recorded "indirect" expenses in preference to a swollen account of unallocated payments that would otherwise result.

Plant and Estates Accounts.—One function of the E. E. and M. transfer journal, Fig. 87, is referred to above, and the necessary link between the costs accounts and the impersonal ledger accounts which this record effects, is self-evident. It will be noticed that for the several monthly debits to plant, etc., there are corresponding credits of a three-fold nature to the accounts of stores purchases, workmen's wages (productive), and profit and loss respectively, so as not to violate the principles for double entry book-keeping. The point herein raised, whereby profit and loss account is relieved by the transfer from the cost records of work done in connection with the company's plant, etc., will be sufficiently clear if it is remembered that material and labour alone would not adequately represent the value of the jobs. Perhaps the best test is to consider what would be the position if the work were contracted for with an outside firm, who would assuredly charge a due proportion for establishment expenses, with the value of material and labour thereon, in addition to a percentage of profit on the outlay. The question is one that affects very materially the departmental manufacturing costs. for it is obvious that, by neglecting this very essential costs factor in these transfers, the result would be to throw the whole of the establishment expenses upon the remainder of the work in progress, falsely inflating the costs of production in a proportionate degree.

Sales Invoices.—The work of invoicing or billing commences with the mailing of advice notes, the bound duplicates of which are handed to the invoice department, having been preceded by the office orders relative thereto. Circumstances will determine whether, in the event of such deliveries being in part completion of an order, the invoices shall not be forwarded until actual completion, the invoice clerk, meanwhile, recording the numbers of such outstanding advice notes.

Sales Daybook.—The official record of sales is a datal classification of the same in what is commonly described as a sales daybook. The essential features of the entries will be understood on reference to Fig. 88, and in entering up this record, of which the invoice sent to the purchaser is a fair copy, the clerk makes reference to his copies of office order and despatch advice note respectively; both of which

1 SALES RECORD FOR THE MONTH OF AUGUST, 1906.

	——August 1st——							
Drs. Ledger folio 2/378	Motor Haulage and Omnibus Company Limited, High Street, Bury.							
	Your order 3154. O.O. F.O. Our reference 316 590							
	To 2 class F motor omnibuses double deck, direct-driven, flash generator with new type burner fitted, built to your specification dated 21st March, 1906	750 0 0	1500	0	0			
	To non-slipping attachment on driving wheels. Extra	30 0 0	60	0	0			
	——— 1 ———					1560	0	0
2/415	County Borough of Bolton, Tramways Department, Town Hall, Bolton							

FIG. 88.—SALES DAYBOOK. SIZE, 12 IN. BY 19 IN.

are indorsed with the daybook folio, upon which the entries appear. In small factories there is a growing custom to use duplicate carbon-copying books as a combined daybook and invoice. The customer's form of invoice in such a case is written in ink, and perforated to facilitate removal, the carbon copy being retained for office reference. The effect of this practice is to remove the necessity for transcription with the liability of errors in copying, resulting in a reduction of clerical routine; and the system has several desirable features which must appeal to the commercial manager whose clerical staff is numerically small.

Debtors' Ledger.—The various entries in the sales daybook are posted to the respective accounts in the debtors' ledger, which bears the same relation to the sales as does the creditors' ledger to the purchases. The manner of posting is in a similarly abridged form, and as the columnar headings are merely a reversal of the left (or debit) and the right (or credit) sides respectively—the reason for which is self-apparent—it is not necessary to repeat the form, which is sufficiently clear in Fig. 85.

Statements.—It is a custom universally adopted to make monthly copies of the various accounts in the debtors' ledger, and to furnish each customer with a statement showing his position with the company. Such statements are, *per se*, a silent demand for payment, and as any balance outstanding from a previous month is shown over the amounts of current invoices rendered in the ordinary course, as also any allowances, part payments, etc., the debtor is enabled to verify his books with those of the company, and to correct any errors that may arise on either side. Such monthly statements of account are in substance merely copies of the ledger accounts, and it is not therefore necessary to reproduce their form.

Credit Notes.—For all returns of a bona-fide character, allowances, and concessions in price, etc., it is customary to use a special form closely resembling the form of invoice, but distinguished therefrom by printing in red. These notes of credit, which are sent to the customer in cancellation of any invoices covering the charges for such returnable goods, etc., are copied from a "returns daybook," the entries in which are of somewhat similar form to those of the "sales daybook," and are obtained from data supplied by the receiving clerk, and, in the case of special allowances, from the accountant personally. In a corresponding manner with stores purchases, there is a record of sales shown in the impersonal ledger, forming with that of the debtors' ledger a double entry. This record is in the form of monthly totals, with a tabulated dissection of the various classes of sales if circumstances call for such a classification, the name of the month and the daybook folio being allied to the respective amounts.

Debtors' and Creditors' Balances.—Following the work of posting the personal ledgers from suppliers' invoices and

Debtors' Creditors'	Ledger Monthly Balances, 19......										
Ledger folio.	Name of account.	Remarks.	October.			November.			December.		

Fig. 89.—Personal Ledger Balances Book. Size, Foolscap.

sales daybook respectively, it is usual for the ledger clerk to prepare a list of each month's debtor and creditor accounts in alphabetical order from the two ledgers already described. This record of monthly balances is contained in foolscap books, and is in the form described by Fig. 89; and as the columnar rulings in the two books are identical, the distinction between them is indicated by the printed heading of the pages. They are for the guidance of the cashier, whose duty it is to see to the payment of the two classes of accounts, under the direction of the board. The routine involved in the discharge of this duty is referred to fully in the section dealing with questions of finance.

Goods sent " On Approval" or " On Loan."—It is absolutely necessary that goods transferred from stock shall be placed on record for obvious reasons, and in the case of supplies delivered " on loan " or " on approval " there should be due recognition of this principle, so that the transactions shall not be lost sight of. It is a frequent occurrence that, to assist a customer who is overtaken by an unfortunate breakdown, and enable him to retain the use of his car, spare parts are supplied for his temporary use pending the repair of the broken or worn-out parts. Strictly speaking, they cannot be allowed to swell the record of sales by being entered in the sales daybook, and the stock transfer is best recorded in a special daybook for such transactions wherein they are entered at a stock value for inventory purposes, and their subsequent return duly noted. The practice entirely removes any possibility of misunderstanding, and keeps such suspensory matters, often of considerable monetary value, constantly under review.

CHAPTER XIII.

CASHIER'S DEPARTMENT.

Qualifications for this important Office.—In considering the question of financial control, in so far as it affects the official under whose direction and supervision the duty of paying and receiving accounts is discharged, it will be recognised how important is the necessity for reliability, care, and methodical routine. Absolute reliance upon his integrity and tactfulness must accompany the appointment of the cashier. He will require to be keenly alert in the collection of outstanding and overdue accounts, in which duty he must exercise all the tactful persistence possible, and in all his duties promptitude must be prominently to the fore. Undoubtedly, an appointment well made in this department is immeasurably important, and in none of his duties can the cashier be so profitably employed as in interesting himself in the prompt collection of moneys due, and the securing of cash discounts on accounts payable. The routine generally may be said to be dictated equally by recognised customs which regulate questions of finance, as by the principles of bookkeeping, which determine what records are needful.

Credit Index.—In order that there shall not be any reigning doubt as to the financial stability of firms desiring credit, the custom is to subscribe to one or more of the many agencies which offer the necessary facilities for inquiry, through which source it is possible to ascertain fairly accurately how clients are accustomed to meet their engagements. This custom is far more satisfactory than the practice of relying on trade references for this information, being, perhaps, less liable to abuse or misinterpretation. All replies to inquiries in such matters are carefully preserved for reference in the cashier's department, either in datal order as received, in which case they are numbered seriatim for reference to a card index of similar character to Fig. 3, or arranged alphabetically in files on the "Shannon" system of sub-division.

Cash Received.—One of the earliest duties of each day should be the acknowledgment of cheques, etc., that the mail brings to hand so that they may promptly be lodged in the bank. Incoming "cash" may consist of bank cheques and drafts—home and foreign—bills of exchange, bank notes, postal orders, and coin; and any accompanying statements of account, or the actual ledger account, should be compared and verified therewith, particular note being taken of any deductions for discount, returns, etc., and any disputed items promptly dealt with. The form of acknowledgment is advisably printed and of distinctive character, the receipts being separately numbered and bound in book form. The books are arranged so as to permit a counterfoil of each receipt being retained by the cashier, affording him considerable assistance in writing up and checking his cash-book; and the official character of the receipts is such that their "bona-fides" are apparent.

General Cash-Book.—The "fair copy" cash-book outlined by Fig. 90, records the whole of the cash transactions for each month in datal order, the cashier's receipts being charged to his debit on the left-hand page, and his payments to credit on the right-hand page. The form of cash-book herein described presents the whole of the transactions in a tabulated account so as to relieve the impersonal ledger accounts of much confusing detail by

50 *Dr.* AUGUST,

Date received.	Particulars.	Ledger folio.	Cash sales.	Bank.	Dis-count.	Total.
1906. Aug. 1	To balce. brought forward. fol	49				46 3 5
,, 1	,, R Hindley & Co.				0 17 6	34 6 0
,, 1	,, S. Duffin, Ld.					525 0 0
,, 1	,, Scrap metal, Whytehead		98 5 6			98 5 6
,, 2	,, Bank, Cheque 3963			50 0 0		50 0 0
,, 3	,, Bank, Cheque 3964			730 0 0		730 0 0
,, 4	,, Bill Payable No. 11					90 0 0
,, 4	,, Barton, Jones & Co.					101 6 0

Date paid.	Particulars.	Voucher No.	Ledger folio.
1906. Aug. 1	By balce. forward	folio	49
,, 1	,, Bank		
,, 2	,, ,, ...		
,, 2	,, James and Thom	249	
,, 3	,, Works wages		
,, 3	,, Travellers' salaries		
,, 3	,, Fixed salaries		
,, 4	,, A. Founder & Co., Ld.	261	
,, 4	,, Bill Receivable No. 42		

↑ *Binding.*

FIG. 90.—CASH-BOOK.

posting monthly totals instead of individual items. Reference to the specimen entries on the debit side will make clear the manner of recording each cheque, etc., received, with discount allowed; as also the cash drawn from bank or received from "cash sales." An explanation of the entries as to cash disbursements is given in a subsequent paragraph.

Waste Cash-Book.—It is usual to keep an additional and separate record of transactions in current coin, as an aid to the daily or weekly check of cash on hand, of which the cashier retains a sufficient amount to meet contingencies. For although it is a desirable and customary rule to pay accounts due by cheques, bearing the prescribed directors' signatures, there are, obviously, many small payments to be made daily in contravention of this rule. The function of the waste cash-book is to record, in a weekly survey, the cash received from bank, or other sources, to meet the demands of wages and salaries due, etc., and the correspond-

1906. *Cr.* **50**

Travellers' salaries.	Management salaries.	Factory wages.	Petty cash payments.						Bank.	Discount.	Total.
			Postages.	Carriage.	Purchases.	Off. exp.	Mfg. exp.	Sundries.			
									9999 9 9		
									559 6 0		559 6 0
									98 5 6		98 5 6
										1 5 7	50 0 0
		650 4 2									650 4 2
12 10 0											12 10 0
	32 5 0										32 5 0
											90 0 0
											101 6 0

SIZE, 24 IN. BY 19 IN.

ing payments. A simple debit and credit form of account meets the needs of the case, being balanced weekly, and the character of the entries is such as to render an explanatory form unnecessary. Suffice it to mention that the entries as to cash received and paid are reproduced in the fair copy cash-book described above, and the weekly balance of cash on hand is checked by the secretary or auditor.

Petty Cash Book.—The petty cashier is responsible for the payment of small accounts, such as carriage on goods received and despatched by passenger train, postage stamps required by correspondence department, and the numerous insignificant items of expense that recur from day to day. The necessary cash required to meet each week's demands is obtained from the cashier, whose entry of the subsequent disbursements is in the form of weekly totals. Fig. 91 describes a convenient form of tabulated record dissecting the various classes of expenditure, and presenting the

PETTY CASH PAYMENTS.			*Week ending* ……………………………19………						
Balance from last week £ : : *Received from cashier* : :	£ : :								
Date.	Details.	Amounts Recoverable.	Charged to Impersonal Ledger Accounts.						
		Noted by	Postages and telegrams.	Carriage and cartage.	Stores purchases.	Office expenses.	Mfg. Expenses.	Sundries.	Weekly total.

These totals are entered on Cr. side of cash-book, weekly.

FIG. 91.—PETTY CASH BOOK. SIZE, FOOLSCAP.

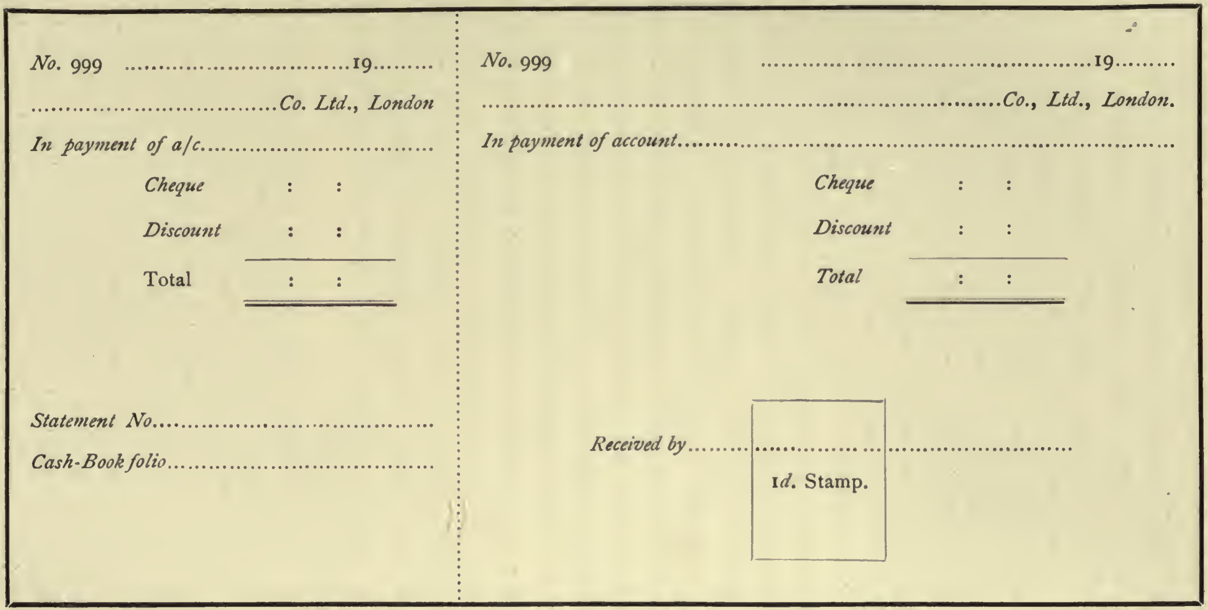
weekly columnar totals referred to. Such payments as carriage on parts received for repair are charged through costs department to the consignor's account.

Cash Payments.—Reverting to the specimen credit entries in general cash-book, Fig. 90, we are led to consider the various daily payments to bank, weekly wages and salaries, and the routine as to the monthly payment of creditors' accounts, which are selected as examples. The first-named amounts are taken from the usual form of bank deposit book counterfoils, in which the cashier records a summary of the cheques, etc., paid into bank, as an aid to the checking of his cash-book, in case of such a necessity arising. The amounts of workmen's wages and staff salaries are obtained from the respective books devoted to those records, the former of which has already been described by Fig. 56. The salaries book is of simple form, which need not therefore be specially described, and, for obvious reasons, the information it contains must be jealously guarded by the cashier as of a confidential character.

Payment of Accounts.—The duties which lead up to, and arise from, the payment of accounts due are repeated with monthly regularity, and contribute very largely to the cashier's responsibilities, as will be observed from the routine described below. In preparation for the board meeting, to which the accountant's statement of credit ledger accounts payable is submitted, the cashier arranges the monthly statements, which have already been verified, in alphabetical classification for ready reference to the balances book, Fig. 89. The statements are then placed in a file, and a list is prepared showing, in a triple cash column form, the amount of each statement, the discount allowed, and the value of the cheque to be drawn, respectively. Bearing the signatures of the cashier and accountant certifying the correctness of the figures, this statement is handed to the secretary for the sanction of the directors' meeting. This obtained, the cheques are drawn up for signature and mailed to the various payees. Accompanying each cheque is a numbered voucher, Fig. 92, which is to be signed by the payee and returned without delay.

Cash Voucher.—The official voucher described by Fig. 92 is adopted with a view to uniformity, and is, in practice, very convenient for various reasons. Each form is perforated for detachment from its counterfoil, the vouchers being substantially bound in book form with three forms on each page. It is customary to send an addressed envelope printed and of distinctive colour with each voucher, and in such case the acknowledgments are quickly separated from general correspondence and handed direct to the cashier on their return. They are then pasted to their respective counterfoils in the book, and a list prepared of unreturned vouchers as an aid to their immediate recovery.

Cash Book Entries of Disbursements.—The batch of envelopes containing cheques, etc. is carefully checked with the list of payments before being sealed and handed to the post desk. The next duty is to write up the cash-book, in which record the voucher numbers are not entered until their return by the firms concerned. It will be noticed that the cashier's credit entry gives the names of the firms in whose favour the cheques are drawn, and the amounts thereof, with the discounts obtained, appear in their respective columns, being subsequently posted to the creditors' ledger. On the debit side of the cash-book are entered corresponding amounts, as a principle of double-entry bookkeeping, and the values of the cheques drawn upon the bank are entered in the column devoted to that account. The latter entries which show the cash nominally received from bank to enable the cashier to pay the amounts entered to his credit on the



No. 999 ....19.........

....................................*Co. Ltd., London*

In payment of a/c....................................

Cheque : :

Discount : :

Total : :

Statement No....................................

Cash-Book folio....................................

No. 999 ....19.........

....................................*Co., Ltd., London.*

In payment of account....................................

Cheque : :

Discount : :

Total : :

Received by....................................

1*d.* Stamp.

FIG. 92.—CASH VOUCHER. SIZE, 7 IN. BY 4 IN. *Perforated.*

other side, are ultimately compared with the bank pass book, a "tick" in folio column denoting that each cheque has been duly honoured. It should be mentioned that a list of cheques drawn, giving the names of the various payees, is prepared for the guidance of the bank officials.

Cash-Book Postings.—The daily entries of cash received from sundry debtors and the monthly payments to creditors, are posted forthwith to the respective ledger accounts which, if fully paid to the amount of the previous month's balance, are ruled off in the manner previously shown. The "double-entry" is completed at each month end, when the balances of cash in hand and at the bank are entered so as to show identical totals in the four columns concerned ; the balances are carried forward as opening entries in the following month, and the columnar totals in the cash-book duly posted to the various accounts in the impersonal ledger, where the figures are available for the accountant's periodical financial statement. It frequently happens that the amount of bank balance as shown by the cash-book, does not agree with the bank pass book ; the difference being accounted for by cheques which have not, as yet, been presented for payment by the payees. A list of numbers and amounts of such unpaid cheques is shown at the end of each month's cash-book entries, as a memorandum for the auditor's guidance.

Bills of Exchange.—The practice of settling accounts by bills of exchange is so customary and prevalent as to justify some consideration as to the manner of dealing with the same at the hands of the cashier. But the form in which they are drawn up and presented for signature, and the procedure as to recording in the bills payable and bills receivable books, with the routine to be followed in case the drawee fails to meet payment when due, are all matters that are made clear in any reputed exposition of bookkeeping principles, to which the student may profitably refer. It may, however, be mentioned that as such documents are, during the period that precedes the due date, little else than securities, necessary steps should be taken to ascertain that the firm upon which the bill is drawn, is sufficiently sound financially. The amount for which the bill is drawn should include a reasonable rate of interest and the "ad valorem" stamp for the accommodation offered by such a system of payment. Generally speaking, the cash-book entries are similar to those which record the receipt or payment of cheques due on demand, with the exception that accounts are opened in the personal ledgers for bills payable and bills receivable respectively, as will be understood by reference to the specimen entries in the form of cash-book described by Fig. 90. Needless to say, the question of finance equally with that of bookkeeping in general, is of much too wide scope to be exhaustively considered in a work on "Commercial Organisation," which will not be expected to supersede the many excellent books on the subject already existing.

CHAPTER XIV.

SELLING AGENCIES AND TRAVELLERS.

Necessity of Organised Effort.—The organisation and direction of the sales department, the function of which is to co-operate with advertising department in an unceasing combat with the legitimate competition of outside firms, each seeking a rarely-achieved monopoly, presents a problem of immense difficulty and importance ; for not all the skill and effort of the producers can survive a sustained stagnation that is produced by impotence in the sales department.

Agents' Aptitude and Training.—Even under conditions where the available supply does not exceed the demand of the market, and efficiency of the manufactured article is combined with a cost of production that is within reasonable range of the earning value of a machine, the salesman is perpetually confronted with those contending factions which threaten to annul his best efforts, and turn the moment of apparent success into one of chagrin and defeat. But delayed success to the diligent and persistent agent is merely the incentive to that change of policy which often marks the well-constructed plan, strengthening his claims upon an army of users by his increased ability to meet current demands of the market. And it is an incontrovertible truism, applicable to no business in a greater degree than to the sale of motor cars, that the demands of the purchaser are paramount to any considerations that appeal to the minds of inventor and constructor. Novel features of design, that may greatly impress the trained, experienced engineer, whether by reason of increased "life" or greater facility in the control and operation of a machine, are points that are overshadowed by the questions of external appearance, accepted principles of current practice, and initial cost. The question of maintenance and upkeep, important though it is, all too frequently becomes of secondary importance, being obscured by that of first outlay; hence it is that the successful salesman must accommodate himself to meet the conditions imposed by his *clientèle* even though it may bring him into conflict with his better intentions. Nevertheless, it is imperative that such sacrifice of efficiency shall not be accepted unchallenged, and to this end the agent should be intimately in touch with every detail of manufacture, equally with the points that make for satisfaction under running conditions, in order that the machine he has to offer shall not suffer in the inevitable comparisons which, however odious, he is constantly called upon to make. In short, convincing proof of superiority in essential features cannot enthusiastically be advanced unless the agent is himself thoroughly acquainted with the principles of design and the methods of construction.

Agents' Reports.—In order that the commercial manager may be acquainted with what transpires between the firm's representatives and prospective clients, and any necessary co-operation duly secured under an organised direction, it is customary for daily reports to be addressed to head office, and any demands for photographs, drawings, suggestions, etc., receive prompt attention. A record as to calls and descriptive matter sent forward is kept in the inquiries card index in the correspondence department, the progress of negotiations being noted on the back of the card. Agents' reports are preserved in separate files for each representative, together with the carbon copies of replies, and each subject may be instantly referred to by the use of an alphabetical index to the numbered contents of the file.

Undesirable Accounts.—Due attention should be paid by the agent to the character of each inquiry, and as a safeguard against entering into contracts with firms of doubtful financial standing, the fullest advantage should be taken of the "credit inquiry" system. It not infrequently happens that an agent will, negligently or otherwise, accept an order without exercising this precaution, and not only should the payment of commission be withheld until the account is duly discharged, but any loss through bad debts incurred by such inadvertence should, by agreement, be wholly or partially made good, out of subsequent earnings.

Agents' Order Forms.—Considerable satisfaction is obtained by the use of printed order forms for the use of travellers, which are so drawn up as to present a sufficiently detailed specification of the required car, being arranged in sections so as to indicate clearly any departures from standard practice and special requirements as to colour and fittings. Misunderstanding is avoided by such a lucidly expressed form of order, and the subsequent progress of the work through the shops is less likely to be interrupted and intermittent than would otherwise be the case.

Collection of Accounts.—While it is very desirable that remittances shall be made to the chief office, it not infrequently happens that travellers are called upon to undertake collection of accounts. The form of acknowledgment for the use of travellers is usually a printed "pro forma" receipt of octavo size, conveying an intimation that the company's official receipt will follow in due course. Moneys so collected should be remitted to the cashier without delay, as otherwise there is a likelihood of unintentional offence resulting through letters, soliciting a settlement, passing between the accounts department and customer.

CHAPTER XV.

SECRETARY'S DEPARTMENT.

Legal Position.—The office of company secretary is of statutory creation, and his responsibilities and duties as between the registrar of joint stock companies and the company's shareholders respectively, with his personal liability for torts, wilful or otherwise, are specifically defined by the legislature. He is the mouthpiece or instrument of the directors or governing body, who are the agents or trustees of the company, and he is the officer directly responsible for the carrying out of such resolutions as are, from time to time, determined upon by the board in meeting assembled.

Duties.—The duties of the secretary in general vary in their scope according to personal qualifications and experience, and are frequently determined by the size of the company and general local conditions. The function of the company secretary is, strictly speaking, clerical and ministerial only. Under the direction of the board, he is the convener of all meetings of that body and of the company, recording the minutes of proceedings thereat, and issuing all the necessary notices. He also conducts the correspondence with shareholders with regard to calls, transfers, etc., and prepares the statutory returns to the registrar of joint stock companies.

Book Records.—The books kept in this department include all such as bear upon the internal business of the company, e.g., register of members, directors' minute book,

....*Co.. Ltd.*

TRADING AND PROFIT AND LOSS ACCOUNT.

To stock.—Rough stores							
Finished stores							
Work in progress							
,, Stores purchases							
Less returns							
,, Wages, productive							
,, ,, Managers and staff							
,, ,, Travellers							
,, Plant repairs							
,, Fabric repairs							
,, Fittings repairs							
,, General expenses							
,, Depreciation							
,, Carriage and cartage							
,, Rents, rates, taxes, and insurance							
,, Fuel, gas, and water							
,, Royalties, patents, and legal expenses							
,, Painting and decorating							
,, Postages and telegrams							
,, Office expenses							
,, Stationery and printing							
,, Trade advertisements							
,, Commissions							
,, Bad debts							
,, Balance, carried to revenue account							

... .*Co., Ltd.*

REVENUE ACCOUNT

To Auditors' and directors' fees							
,, Income tax							
,, Interim pref. dividend							
,, Interim ord. dividend							
,, Balance disposable carried to balance sheet							

London.

July 2nd, 1906, to September 29th, 1906.

By Sales.—Cars							
Repairs and sundries							
Total							
Less returns							
,, Stock.—Rough stores							
Finished stores							
Work in progress							
,, Discounts and interests							

London............

as at September 29th, 1906.

By Balance forward...							
,, Brought down from Profit and Loss Account							

..................................*Co., Ltd.*

BALANCE SHEET

CAPITAL AND LIABILITIES.

NOMINAL CAPITAL.						
10,000 ord. shares, £10						
5000 pref. shares, £10						
SUBSCRIBED CAPITAL.						
8500 ord. shares, £10...						
4500 pref. shares, £8						
Sundry creditors						
Reserve fund						
Balance disposable per revenue account						

as at September 29th, 1906.

PROPERTY AND ASSETS.

FIXED PROPERTY.							
Buildings							
Estate							
Total							
Less 2½% deprec.							
MOVABLE PROPERTY.							
Stock :—Rough stores							
Finished stores...							
Work in progress							
PLANT.							
Standard drawings							
Less 10% deprec.							
Standard patterns							
Less 20% deprec.							
Jigs, gauges, templates							
Less 20% deprec.							
Machine tools							
Less 10% deprec.							
Loose tools							
Less 20% deprec.							
Blocks, woodcuts							
Less 25% deprec.							
Fixtures and furniture							
Less 12½% deprec.							
DEBTS.							
Bills receivable							
Sundry debtors							
,, ,, doubtful							
CASH AND INVESTMENTS.							
Cash in office							
Bank of England							
3% deb. bond, X. Y. Co., Ltd.							

minute book of general meetings, register of directors and managers, register of mortgages, annual summary and return book, all of which are obligatory under the Act. There are also other books which are indispensable and customary, such as the share ledger, transfer book, etc., which are common to both private and public companies registered with limited liability. Although the preparation of the final books of account, i.e., trading and profit and loss account, balance sheet and the revenue charges—of which the specimens given below show their relation to the routine detailed in the respective sections referring to costs and accounts—is in a small company often undertaken by the secretary, the duty is one that generally devolves upon the accountant.

Publications Recommended for Reference. — To the student of the law and practice of joint stock companies there is, perhaps, no more valuable book of reference than "Palmer's Company Law," which contains a complete record of the Acts from 1862 to the present, together with a clear, authoritative exposition of all important features. Similarly, there is no more useful publication dealing with the duties and responsibilities of the company secretary than the popular "Secretary's Manual," published by Jordan and Sons, which requires no pressing recommendation of the author by reason of its extensive circulation.

APPENDIX.

STAMPS, FINANCE AND REVENUE ACTS.

The law governing the stamp duties payable, and the methods of payment, will be found set out in the Stamp Act, 1891, and in various subsequent Finance and Revenue Acts. The following statements founded on those Acts may be found useful.

Many contracts are, for revenue purposes, required to be stamped, and if so, they cannot, except in criminal proceedings, be used in evidence unless the proper stamp has been affixed, and in the proper manner. When the instrument is produced in Court, the Court must examine it, and if it appear that the duty has not been properly paid, in accordance with the Acts for the time being in force, the Court will refuse to look at it, unless it is such as may be stamped after execution, and the proper duty, together with any penalty incurred, is paid.

If a document is lost or destroyed, the presumption is that it was stamped, but this can be rebutted by the production of evidence showing that it was unstamped when last seen; and if a party refuses to produce a document, the presumption is that it was stamped, until the contrary is shown.

The stamp must, in the absence of special statutory provision, be affixed previously to or at the time of execution of the instrument, unless the first execution took place out of the United Kingdom, in which case it may be stamped within thirty days of its arrival within those limits. Unless expressly forbidden by statute, any instrument may be stamped after execution on payment of a penalty of £10, and the duty, together with interest at 5 per cent., if the amount unpaid exceeds £10; and when it is desired to use in Court a document improperly stamped or unstamped, a penalty of £1 in addition to the above must be paid. But the Commissioners of Inland Revenue are empowered to remit the penalty, or any part of it, and the general practice is to stamp without penalty within fourteen days after execution of an agreement under hand. With other instruments, such as bonds, conveyances on sale, leases, mortgages, debentures, transfers releases and assignments thereof, equitable mortgages and settlements, the limit of the allowance is thirty days.

Manner of Writing and Stamping Instruments.—All instruments are to be written in such a manner, and the stamp must be so affixed, that it cannot be used for any instrument other than that to which it relates ; and if more than one instrument be written on the same piece of paper, each is to be stamped separately to the extent of its proper duty. If the stamp is, by any word or words on the face of it, to be appropriated to any particular description of instrument, it is valid only for that particular purpose. Unless express provision is made, the stamp must be an impressed stamp, but amongst instruments that may be stamped with an adhesive stamp are agreements under hand, contract notes, and receipts. For others, see under the respective headings below. When in proper cases an adhesive stamp has been used, it must usually be cancelled by the party first signing, and he should write his name or initials, and the true date, across the face of the stamp or stamps.

In an Agreement, or any Memorandum of Agreement, made under hand only, and not otherwise specifically charged with duty, whether the same be only evidence of a contract, or obligatory upon the parties, the Stamp Duty is 6*d.*

Amongst Mercantile Instruments which do not require to be stamped are the following :—

(1) Agreement, letter, or memorandum made for or relating to the sale of any goods, wares, or merchandise.

(2) Agreement or memorandum made between the master and mariners of any ship or vessel for wages on any voyage, coastwise from port to port in the United Kingdom.

(3) Agreement or memorandum the matter whereof is not of the value of £5.

(4) Agreement or memorandum for the hire of any labourer, artificer, manufacturer, or menial servant.

The Duty may be denoted by an adhesive stamp.

Bank Note.—This, for stamp purposes, includes any bill of exchange or promissory note issued by any banker, other than the Bank of England, for the payment of money not exceeding £100 to bearer on demand; also any bill of exchange or promissory note so issued which entitles, or is intended to entitle, the bearer or holder thereof, without endorsement, or without any further or other endorsement than may be thereon at the time of issuing thereof, to the payment of money not exceeding £100 on demand, whether the same be so expressed or not, and in whatever form and by whomsoever the bill or note is drawn or made. No stamp is required on re-issue.

	s.	*d.*
Exceeding £50 but not exceeding £100	8	6
,, £30 ,, ,, £50	5	0
,, £20 ,, ,, £30	3	0
,, £10 ,, ,, £20	2	0
,, £5 ,, ,, £10	1	9
,, £2 ,, ,, £5	1	3
,, £1 ,, ,, £2	0	10
Not exceeding £1	0	5

Bills of Exchange and Promissory Notes.—A bill, for the purpose of the Act, includes (1) any draft, order, cheque, or letter of credit, and any document or writing (except a bank note) entitling or purporting to entitle any person, whether named therein or not, to payment by any other person of, or to draw upon any other person for, any sum of money; and the expression "bill of exchange payable on demand," includes (*a*) an order for the payment of any sum by bill or note in satisfaction of any sum of money, or for the payment of any sum of money out of a particular fund, or upon any condition or contingency which may or may not be performed or happen; (*b*) an order for the payment of any sum of money at any stated periods (e.g. weekly), and also an order for the payment of any sum of money after the date of the instrument, and sent by the maker to the intended payer, and not to the person intended to be paid.

Bill of Exchange (payable on demand, or at sight, or on presentation, or within three days after date or sight), see Finance Act, 1899, s. 10 (2), 1*d.*

Bill of Exchange of any other kind or promissory note (except a bank note), if drawn, or expressed to be payable, or (subject to the exception stated below) actually paid, or endorsed, or otherwise negotiated in the United Kingdom—

	s.	*d.*
If the value for which the instrument is drawn does not exceed £5	0	1
Exceeding £5 and not exceeding £10	0	2
,, £10 ,, ,, £25	0	3
,, £25 ,, ,, £50	0	6
,, £50 ,, ,, £75	0	9
,, £75 ,, ,, £100	1	0
And for every £100 or fractional part thereof ...	1	0

The Duty on bills of exchange drawn and expressed to be payable out of the United Kingdom where actually paid, endorsed, or negotiated in the United Kingdom, shall, where the amount for which the bill is drawn exceeds £50, be reduced so as to be—

	s.	*d.*
Exceeding £50 and not exceeding £100	0	6
Exceeding £100, for every £100 or fractional part thereof	0	6

For exemptions from duty, see the Schedule to the Act of 1891.

The stamp must be affixed before execution, unless (1) the bill or note was drawn or made out of the United Kingdom; (2) the bill is one payable on demand, and is liable to the 1*d.* duty; in this case the stamp, which may be an adhesive stamp, must be affixed and cancelled before it leaves the signer's custody; (3) the bill, though sufficiently stamped as to amount, contains a stamp of an improper denomination; in this case the stamp may be affixed before the bill becomes due on payment of 40*s.* penalty, and after it becomes due on payment of a penalty of £10.

Bills issued in a set need not all be stamped; the duty having been paid on one the others may be offered in evidence, and this though the stamped bill has been lost. If the instruments are separately negotiated this rule will not apply.

Bill of Lading.—This must be stamped before execution. The duty is 6*d.*

Bill of Sale.—Absolute (see under Conveyance); Conditional (see under Mortgage).

Charter-Party.—The duty is 6*d.* It may be denoted by an adhesive stamp, and this must be cancelled by the person by whom the instrument is last executed or by whose execution it is completed as a binding contract. If the instrument was not stamped before execution, the omission may be rectified within a month by means of an impressed stamp on making certain payments.

Cheque.—See Bill payable on demand.

Contract Note.—This means, for revenue purposes, the note sent by a broker or agent to his principal (except where such principal, being a member of a stock exchange in the United Kingdom (Finance Act, 1899, s. 13), is acting as broker or agent for a principal), advising him of the sale or purchase of any stock or marketable security. A note advising the sale or purchase of more than one description of stock or marketable security, is deemed to be as many contract notes as there are descriptions of stock or security sold or purchased. The duty must be denoted by an adhesive stamp; and, if the duty be 1*s.*, by a stamp specially appropriated to contract notes. The stamp must be cancelled by the person by whom the note is executed.

	s.	*d.*
Contract note relating to the sale of stock of the value of more than £5 and less than £100	0	1
Contract note relating to the sale of stock of the value of more than £100 and upwards (Customs and Inland Revenue Act, 1893, s. 3)	1	0

A broker who either omits to stamp such contract note, or fails to execute and transmit one to his principal where required so to do, forfeits all legal claim to commission. (Stamp Act, 1891, s. 53; Revenue Act, 1898, s. 7 (1).)

Conveyance or Transfer.—Transfer on Sale. The law relating to this may be found in the Stamp Act, 1891, ss. 54 et seq., and Schedule. (See also as to foreclosure decrees, Finance Act, 1898, s. 6.) An agreement for sale of the property is frequently charged with the same *ad valorem* duty as is the actual sale (see s. 59 of the Stamp Act, 1891).

For the purpose of this work it suffices to say that the following duties are generally payable :—

	s.	*d.*
Where the consideration is not more than £5 ...	0	6
Where it exceeds £5 and does not exceed £10 ...	1	0
,, ,, £10 ,, ,, £15 ...	1	6
,, ,, £15 ,, ,, £20 ...	2	0
,, ,, £20 ,, ,, £25 ...	2	6
And 2*s.* 6*d.* additional for every £25, or part thereof, until the amount reaches £300, and then 5*s.* for every £50, or part thereof.		

Deed of any kind not specifically described in the Stamp Act is liable to duty—10*s.*

Delivery Order for goods to the value of 40*s.* or upwards, lying at a dock, wharf, warehouse, or similar place, signed by or for the owner of the goods, 1*d.* The duty may be denoted by an adhesive stamp.

Dock Warrant.—See Warrant for Goods.

Letter of Allotment, or of Renunciation.—Where nominal amount allotted or renounced is under £5, 1*d.*; in other cases (Finance Act, 1899, s. 9), 6*d.*

Letter of Attorney.—For the purpose of appointing a person as proxy to vote at any one meeting, 1*d.* For any purpose not specifically described in the Schedule to the Stamp Act, 1891, 10*s.*

There are certain exemptions; thus, by the Bankruptcy Act, 1883, s. 144, and the Finance Act, 1895, s. 16, proxies given by creditors or contributories in connection with meetings in a bankruptcy or in course of the winding-up of a company by the Court, are exempt from stamp duty.

Letters of Credit.—See supra, Bill of Exchange.

Marine Insurance Policies.—These may be stamped for the purpose of production in evidence, after execution, on payment of a penalty of £100.

The ordinary rates are as follows :—

	s.	*d.*
Where the premium does not exceed the rate of 2*s.* 6*d.* per cent. of the sum insured	0	1
For every £100, or fractional part thereof, insured upon any voyage	0	3
For time, in respect of every full sum of £100, and also any fractional part thereof—		
If the time does not exceed 6 months	0	3
,, ,, ,, 12 ,, ...	0	6

Mortgage, *Bond*, *Debenture*, *Covenant*, except a marketable security otherwise specially charged with duty, and

Warrant of Attorney to confess judgment—

(1) Being the only or principal or primary security, other than an equitable mortgage, for—

	s.	*d.*
The payment or repayment of money not exceeding £10	0	3
Exceeding £10 and not exceeding £25	0	8
,, £25 ,, ,, £50	1	3
,, £50 ,, ,, £100	2	6
,, £100 ,, ,, £150	3	9
,, £150 ,, ,, £200	5	0
,, £200 ,, ,, £250	6	3
,, £250 ,, ,, £300	7	6
For every £100 and fractional part thereof	2	6

(2) Being an additional, collateral, or substituted security, other than an equitable mortgage, for the above, where the former has been duly stamped—

For every £100, and every fractional part thereof ... 6*d.*

Equitable Mortgage.—Agreement or memorandum under hand only relating to the deposit of any title deeds or instruments, constituting or being evidence of the title to any property whatever, other than stock or marketable security, or creating a charge on such property—

For every £100, and every fractional part thereof .. 1*s.*

Notarial Act.—See infra, Protest. 1*s.*

Power of Attorney.—See supra, Letter of Attorney.

Promissory Note.—See supra, Bills of Exchange.

Protest.—Where the duty on the bill does not exceed 1*s.*, the same duty as on the bill, otherwise the duty will be 1*s.* The stamp may be adhesive, and must be cancelled by the notary.

Proxy.—See supra, Letter of Attorney.

Receipt.—This means any note or writing whereby any money amounting to £2 or upwards, or any bill or note amounting to the same, is acknowledged to have been received, deposited, or paid, or whereby any debt, or any part of a debt, of the amount of £2 or upwards, is acknowledged to have been settled, satisfied, or discharged, or which signifies such acknowledgment.

The duty may be denoted by an adhesive stamp, which must be cancelled by the person by whom the receipt is given before he delivers it out of his hands. If unstamped before execution, it may be stamped afterwards by an impressed stamp, but upon payment of a penalty of £5 if the receipt has been given not more than 14 days, or if within a month, then upon payment of a penalty of £10.

Amount of duty, 1*d.*

For exemptions, see the Schedule to the Stamp Act, 1891, as amended by Finance Act, 1895, s. 9, and extended by Revenue Act, 1898, s. 8 (14), (15).

Script Certificate.—1*d.*

Share Warrant.—An amount equal to three times the amount of the *ad valorem* stamp duty which would be chargeable on a deed transferring the shares or stock specified in the warrant or certificate, if the considerations for the transfer were the nominal value of such shares or stock.

Stock Certificate to Bearer.—See Share Warrant. These duties now extend to instruments issued by any company in the United Kingdom, and having a like effect as such a share warrant, or stock certificate to bearer. Finance Act, 1899, s. 5.

Warrant for Goods.—3*d.* Exemptions—

(1) Any document given by any inland carrier, acknowledging the receipt of goods conveyed by him.

(2) A weight note issued with a duly stamped warrant, and relating solely to the same goods, wares, and merchandise.

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